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ABSTRACT

This report covers the period October 1, 1976 to September 30, 1977. Chapter 1 gives an overview of observations and recommendations by the National Council on Educational Research (NCER) to the president and Congress. NCER policies, priorities, and committee activities are briefly described in Chapter 2. Chapter 3 is an essay by Patricia Albjerg Graham, director of the National Institute of Education (NIE), on the emerging maturity of educational research. Chapter 4 reviews research activities in five NCER-mandated priority areas: basic skills, educational equity, financial productivity and management, dissemination of research results, and school capacity for problem solving. This year's report has a special focus-- fundamental research relevant to education. As part of an in-depth coverage of that topic, Chapter 5 gives lengthy significant exerpts from the NIE-commissioned report of the National Academy of Science entitled Fundamental Research and the Process of Education. Educational goals, public issues, and research issues of eight topics relevant to education are discussed in detail: cognitive development; out-of-school education; reading; the brain and new processes; institutional innovations; higher educational opportunities; multicultural students; and social environment. Finally, Chapter 6 reflects upon public opinion regarding the performance of American education. (CP)

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Reflections and Recommendations

Fourth Annual
Report of
The National
Council on
Educational
Research

The National
Institute of
Education
U.S. Department of
Health, Education and Welfare
Washington, D.C. 20208

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Reflections and Recommendations

Fourth Annual
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The National
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Research

1978

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AN ACT: NATIONAL INSTITUTE OF EDUCATION

The Mission of the National Institute of Education

from SEC. 405 of the General Education Provisions Act, 20 U.S. Code 1221e, (PL 92-318)
As amended by PL 93-380 and PL 94-482

"SEC. 405. (a) (1) The Congress hereby declares it to be the policy of the United States to provide to every person an equal opportunity to receive an education of high quality regardless of his race, color, religion, sex, national origin, or social class. Although the American educational system has pursued this objective, it has not yet attained that objective. Inequalities of opportunity to receive high quality education remain pronounced. To achieve quality will require far more dependable knowledge about the processes of learning and education than now exists or can be expected from present research and experimentation in this field. While the direction of the education system remains primarily the responsibility of State and Local governments, the Federal Government has a clear responsibility to provide leadership in the conduct and support of scientific inquiry into the educational process.

"(2) The Congress further declares it to be the policy of the United States to—

"(i) help to solve or to alleviate the problems of, and promote the reform and renewal of American education;

"(ii) advance the practice of education, as an art, science, and profession;

"(iii) strengthen the scientific and technological foundations of education; and

"(iv) build an effective educational research and development system.

"(b) (1) In order to carry out the policy set forth in subsection (a), there is established the National Institute of Education (hereinafter referred to as the 'Institute') which shall consist of a National Council on Educational Research (referred to in this section as the 'Council') and a Director of the Institute (hereinafter referred to as the 'Director'). The Institute shall have only such authority as may be vested therein by this section.

"(2) The Institute shall, in accordance with the provisions of this section, seek to improve education in the United States through concentrating the resources of the Institute on the following priority research and development needs—

"(A) improvement in student achievement in the basic educational skills, including reading and mathematics:

"(B) overcoming problems of finance, productivity; and management in educational institutions;

"(C) improving the ability of schools to meet their responsibilities to provide equal educational opportunities for students of limited English-speaking ability, women, and students who are socially, economically, or educationally disadvantaged;

"(D) preparation of youths and adults for entering and progressing in careers; and

"(E) improve dissemination of the results of, and knowledge gained from, educational research and development, including assistance to educational agencies and institutions in the application of such results and knowledge. . . ."

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*Years shown are from year of initial appointment to year term expires; some members will continue to serve pending new appointment actions.

Foreword

How to make education the individual and national instrument of freedom, equality, and excellence that we Americans expect it to be is a question that is with us today more than ever before. Yet despite concerns about the rising costs of education and skepticism about its results, many seem reluctant to look to research for advice and assistance. Considering the nation's investment in education—we spend more than $120 billion annually—it is unfortunate that research is not the full partner in the educational enterprise that it should be.

It was to enhance research and give it new impetus and leadership that Congress created the National Institute of Education in 1972. Congress also incorporated directly into the NIE the National Council on Educational Research to guide its program and policies toward the concerns of citizens, scholars and educators throughout the nation.

This Fourth Annual Report covers the period October 1, 1976 to September 30, 1977, with some excursions into more recent developments. Chapter I provides an overview of our observations and recommendations on education, educational research, and the Institute's activities and aims. The Council's own activities during the year are briefly described in Chapter 2. Chapter 3 is an essay on the maturing of educational research by NIE Director Patricia Albjerg Graham, who sees educational research gaining a new sense of mission, direction and confidence. Chapter 4 reviews highlights of a year of transition for NIE.

Just as our 1976 Report discussed the Institute's role in curriculum development within a general theme of the limits and opportunities of educational research, this year's Report has a special focus: fundamental research relevant to education. We are pleased to offer to a wider readership significant excerpts from the NIE-commissioned report of the National Academy of Science, *Fundamental Research and the Process of Education*, as part of the in-depth coverage of that important topic in Chapter 5.

Lastly, and in what might be called a *quo-vadis* vein, Chapter 6 offers additional reflections on education and educational research in America today.

Acknowledgements

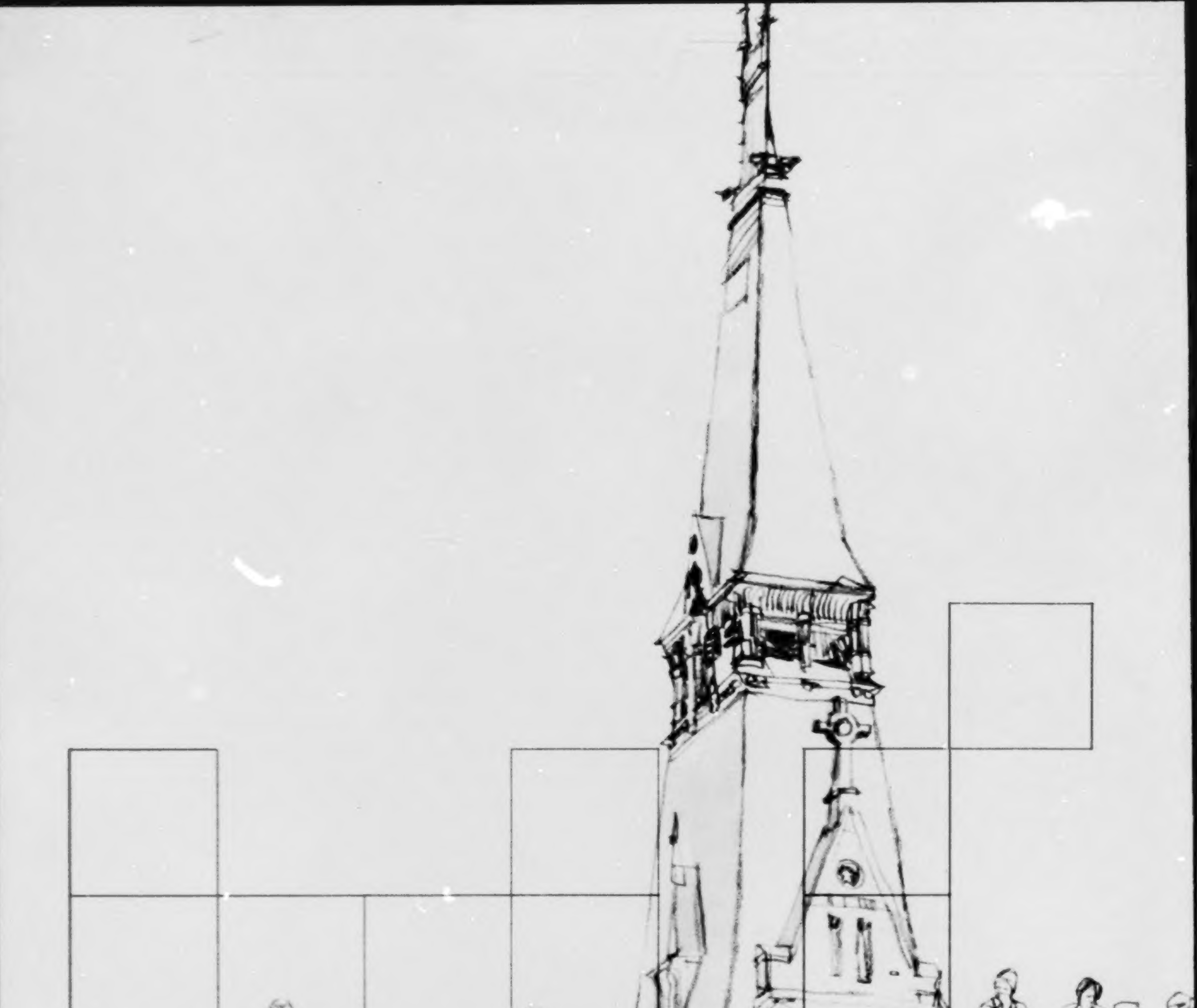
During the period covered by this Report, the National Institute of Education benefited from the capable leadership of three Directors: Harold Hodgkinson, Emerson Elliott, and Patricia Albjerg Graham. Their intellectual strengths, steadfast dedication to educational research and public service, and good-humored common sense led to continued improvement in the work of the Institute. They made the Council's tasks interesting and gratifying and did much to enhance the progress of educational research and development in the United States. The Council acknowledges with thanks the past leadership of NIE, and we commend highly the energetic start Dr. Graham has made in her stewardship of the Institute. The Council anticipates a lasting and mutually satisfying working relationship with the Director and the NIE staff.

In the conduct of its work, the Council benefits from the work of its staff office, headed by Peter Gerber. The relationships of the Council with the Institute, with the Department of Health, Education and Welfare, with the Congress, and with constituent groups are complex ones; it is this arena in which Peter Gerber and the NCER staff work to bring together people and ideas, and to assist in the development of strategies and the conversion of Council policies into activities and programs. In the preparation of this Report, as in all of our work, we recognize with thanks the involvement of the Council staff.

The Council gratefully acknowledges Esther Hemsing, who drafted major portions and edited all of this Report. Additional editorial assistance was provided by Sylvia Shauck, and typing of the manuscript was the responsibility of Ella Jones, our Administrative Coordinator. We were also assisted by NIE staff members John Mays, Robert McMeekin and John Wirt.

The Fourth Annual Report of the NCER was prepared under the direction and supervision of the Council's own Committee on Review and Reports, whose members are Chester E. Finn, Jr. (Chairman), Dominic Guzzetta, Larry Karlson, Jewel Lafontant, and Frederick Schultz.

The illustrations and design of this Report are the work of Paul Salmon.



Chapter 1

Overview and Recommendations

Five years after creation of the National Institute of Education, it is not unexpected that parents, legislators and educators alike ask what it has accomplished, as well as what it intends to accomplish. It is a responsibility of the National Council on Educational Research (NCER) to attempt to answer those questions—to hail accomplishments, note shortcomings and explain intentions. Above all, we hope that our observations may land a realistic perspective to expectations for the Institute.

Signs of Progress at NIE

In reviewing the past year, the Council finds many encouraging signs. Under the renewed legislative authorization of the Institute, Congress increased the appropriation for fiscal year 1978, the first increase in the entire five years of the Institute. The willingness of Patricia Albjerg Graham to undertake the directorship of NIE is also heartening, as is her selection of some able colleagues.

Dr. Graham's reorganization of the Institute, approved by Secretary Califano on March 21, 1978, and described in Chapter 4 of this report, has produced a new structure which will focus energies and resources sensibly on the Institute's missions.*

The Institute has completed the major part of the ESEA "Title I" Study, mandated by Congress in 1976. This was not only an achievement in itself; it also demonstrated the Agency's ability to distinguish itself in studies designed to inform pressing policy decisions facing the Federal Government, and to present its findings forthrightly and cogently to those who may make use of them. Equally important, it may signal a renewed willingness of the Congress to engage the research community in the consideration of major educational policies and to provide resources for that involvement. NIE can play a crucial intermediary role in such a development, though care must be taken to avoid distorting the long-term research process to meet short-term demands for analysis appropriate to policy debates.

Completion during fiscal year 1977 of the National Academy of Sciences' study of ***Fundamental Research and the Process of Education*** was perhaps the most thorough and penetrating examination yet undertaken of basic educational research and the support of such research by the Federal Government. The issues and policy implications raised in that report dominated the Council's attention this year and crystallized our thinking in this important domain of Institute activity. It also illustrated the wisdom of inviting a diverse and distinguished panel of knowledgeable individuals to help the Council understand a complex set of issues. Critiques solicited from a broad spectrum of researchers and educators in connection with this study helped us develop a responsible policy for the Institute (see Chapter 5). We intend to make use of similar mechanisms in the months ahead.

Some Thoughts on Education, Educational Research and the Institute

It is never easy for a broadly representative body such as this Council to reach firm conclusions about complex and sensitive matters, or to voice its conclusions in clear, direct language. Yet in reviewing the work and missions of the Institute against the perspective of education and educational research in America today, we find ourselves in substantial agreement on a number of points.

Education holds immense importance for individuals and for society; schools, as the principal formal institution for education, are important to the achievement of many social goals, but it is seldom possible for public policy to effect purposeful changes in individuals or society merely through changes in the schools. Hence, while education should be prized, and the potential of schools fully developed, their limitations as agents of change should also be acknowledged.

Last year the Council explored the limits and the opportunities of educational research and practice. We would like to re-emphasize our belief that schools cannot alone give meaning and purpose to one's life if other conditions render that sustaining hope false. Education can wonderfully enhance a person's life, can warm the cultural and intellectual climate of a community, can transmit information, values and skills from one person or generation to the next, can even enhance the technological prowess of a nation. It can help people develop themselves fully; but it cannot and ought not obliterate individual differences or make persons of dissimilar talents or interests the same. While schools can help individuals improve their performance, they cannot raise more than fifty percent of the population above the median on any gauge of social or intellectual standing (though the median might rise as an indication of general improvement). Thus neither education nor schooling can be considered wholly apart from the social context in which we live, strive and achieve.

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*A scheme of the current NIE organizational framework is on page 33.

Freed from misguided expectations, education may be better appreciated for what it *can* do, and the efforts and problems of educational institutions may be better understood. One important task of the National Institute of Education is to strengthen the abilities of educational systems to carry out their various roles efficiently, adroitly and humanely. But this is feasible only when those roles are clearly understood.

The statute establishing the National Institute of Education boldly declares it "to be the policy of the United States to provide to every person equal opportunity to receive an education of high quality regardless of race, color, religion, sex, national origin, or social class." The nation was founded on the assumption that such policies are reasonable, appropriate and feasible, and the Institute exists today primarily in order to help attain that goal. The Council also recognizes that the policy rests on two key concepts, neither of which is clearly defined in the statute. These concepts are "education of high quality" and "an equal opportunity to receive such an education." One does not yet detect a serviceable national consensus around either of these concepts, and we are not sure that it is reasonable to expect a research agency to clarify matters that statesmen wrestle with, philosophers dispute, and elected officials have not reconciled. But the Institute has a solemn responsibility to try.

In the Council's judgment, the Institute's research function is central to the achievement of missions assigned it by Congress, although it is also necessary to pursue related functions, including research, development, evaluation studies, policy analysis, and dissemination.

Opinions will differ about the relative "weights" that should be assigned to these activities. After extensive review of NIE's early years, the Council determined that insufficient emphasis was being given to the "basic" or "fundamental" research function. The Council's most important, and perhaps most controversial, accomplishment of 1977—reviewed at length in Chapter 5 of this report—was the development of a policy to guide the Institute in its future support of such research. In particular, we sought to ensure that fundamental research will occupy a central place in the program of the Institute.

Our emphasis on fundamental research does not derive from a romantic notion that the brilliant scholar, if given the freedom and resources to follow his curiosity where it leads, will eventually discover the secret of the educational universe. Rather, it evolves from a realistic appraisal of today's perplexing educational problems and from an awareness that, while many problems can be alleviated with present knowledge skillfully applied, many others cannot be solved with what is now known. These include some that a humane society would properly rank among its foremost educational concerns, such as achieving reasonable certainty that every citizen will acquire competence in the basic skills of reading, writing and computation.

As noted before, our Third Annual Report, covering fiscal year 1976, emphasized the enduring theme of "limits and opportunities" in educational research. The intervening months have seen some improvement in the Institute's ability to acknowledge limits and seize opportunities. Implicit in this formulation is the idea of "researchable problems"—the need to winnow out, from the many educational problems we might like to see solved, those to which research can offer the greatest benefits—and the commitment to focus on them in sustained and systematic ways.

"The worst, the most corrupting of lies," sociologist Michael Polanyi observed, "are problems poorly stated." The relevance to education—and particularly to educational research—of that sage statement, is underscored in Director Graham's essay (see Chapter 3). She traces the historic tendency of educational researchers to shape their mission around problems that may be well-stated in terms of traditional academic disciplines but that are ill-defined with respect to the education enterprise itself. Lacking a distinctive methodology of their own, less than fully confident of the scholarly status of their work, uncertain about the links between "research," which implies the rigor of a science, and educational practice, which is still largely an art, they have missed opportunities for creative and useful inquiry. The fact that research has already contributed to improvement in educational practice—examples of which are cited in Chapter 5 and elsewhere in this Report—tempers but does not contradict this point.

Director Graham calls for a gradual but thorough rethinking of educational research concepts. This does not mean dismissing past results or turning away from currently promising avenues of exploration, and it most certainly does not mean denying the practitioner the benefit of the best current knowledge during the period when researchers are striving to learn more. But it does suggest a purposeful quest for well-stated problems in education—

problems whose future solution is plausibly related to increased knowledge about the behavior and interactions of individuals and institutions. This is not apt to produce a single, monolithic new research "model"; rather, it may yield a number of approaches, some familiar, others novel, and, if successful, will confer renewed dignity and respectability on the creative researcher or practitioner who devises a fresh approach or makes better use of an old one, who values craft as well as science.

Often it takes persistence to test a hypothesis, develop a technique or evaluate an innovation. Educational research needs ample time and adequate resources, and ought not be subject to constant demands for fresh "proof" of its "results." It must be allowed to explore multiple avenues, even though many will yield no tangible results in the short run and some will turn out to be blind alleys.

To be sure, researchers must also be held "accountable." Agencies entrusted with public funds to foster research must have a clear sense of what they are doing and why, a readiness to review their work with peers and putative beneficiaries, a willingness to bring mature projects to conclusion and to terminate those that, after a fair test, show scant prospect of results. But accountability in research is a subtle concept and must not be clumsily applied. In some instances it may be necessary to wait many years before judging a particular line of inquiry to have been exhausted. For when one is exploring uncharted terrain, it is possible that the surveying and map-making itself will enable those coming later to make their way to destinations that today cannot even be specified. What is more, the initial explorers may themselves happen upon something they had not expected to find, and indeed may not recognize or understand at the instant of finding it, but that may one day prove immensely valuable.

Council Comments and Recommendations

The Council has a statutory responsibility to provide comments and recommendations to the President and Congress. Many such suggestions are implicit elsewhere in this commentary. We would take this additional opportunity, however, to make several points explicit:

1. The Institute can help "solve" problems that are appropriate to, and within the capacity of, educational research. One should not, however, look to the Institute for "crisis intervention" or to repair all manner of social malfunction. It is what it was created to be, a research agency charged with advancing our understanding of something quite subtle and complex: the educational process. Over time, that enhanced understanding will lead to improved educational practice, and that practice will have a salutary effect on individuals and on the society they inhabit.

2. The Senate Committee on Human Resources invited Director Graham, when she testified before it, to return for periodic consultations about NIE programs and findings. Council member Frederick Schultz emphasized the value of such consultations during his confirmation hearings. Generally, such consultations take place only during times of crisis. We look to both Houses of Congress for opportunities to discuss general education issues, research strategies and findings which might aid in consideration of a framework for educational policy and in better use of research in the development of legislation and expression of Congressional intent.

3. Among the major policy responsibilities entrusted to the Council is selecting the two or three major educational problems the Institute can realistically be expected to work on during a given period of time. To aid our deliberations, we ask the leaders of the Congress to discuss with us their perceptions of these problems. Mindful that it has not been eight years since the presidency focused clearly on the value of educational research, we also particularly invite such attention from the topmost levels of the Executive Branch.

4. When NIE is called upon by Congress or the Executive Branch to evaluate Federal education programs and their impact, it can be taken as a welcome sign of confidence. Nevertheless, we must sound a note of caution: such evaluations can deflect too much of the Director's attention and the Institute's resources away from the agency's central research mission and its intricate task of linking research to educational practice. We recommend that Congress and the Executive Branch consult with NIE before such requests are formally advanced or, indeed, made into law. It may sometimes be more appropriate for NIE to provide advice for others conducting such evaluations and studies rather than to conduct them itself. From time to time NIE may need to resist the allure of such requests and to concentrate on its priorities. Whenever such evaluations are undertaken, an intended byproduct must be the enrichment of the Institute's research agenda.

5. The distinction must be preserved between the support of educational research as conducted by the NIE and the support of educational practice engaged in by the Office of Education and other agencies. The Institute should not be regarded as a "funding agency" to which individuals and organizations look for maintenance funds. It must be encouraged and enabled to select, on the basis of merit and quality, those who will help carry out its essential research function and to reject proposals of inferior caliber or lesser relevance to its primary missions.

6. President Carter has proposed the creation of a separate, Cabinet-level Department of Education, and there appears to be substantial support in Congress for that idea. In that context, we wish to emphasize our strong conviction that educational research should retain a strong and distinct organizational identity within whatever larger structure is developed. The support of educational research should not be mistaken for a staff function akin to planning and evaluation. It is, and should remain, a distinctive governmental activity in its own right which demands some

protection from the pressures and constraints of day-to-day policymaking and management.

7. Whatever the organizational structure, education research and development activities are sure to continue to be located in numerous Federal agencies outside the principal education unit. This calls for a continuous effort to foster communication and coordination among those agencies. The recent establishment of the Federal Council on Educational Research and Development, chaired by the NIE Director, offers one promising model for leadership and coordination, and we strongly urge that it, or something like it, be retained and reinforced.

8. Educational research can only bear fruit if it is adequately nourished. Without rehearsing again the well-known statistics about the tiny fraction of national educational outlays devoted to research and development, we would emphasize the importance of keeping the Institute's general budget at least one step ahead of inflation. While the agency should be subject to the probing justification of expenditures implicit in "zero-based" budgeting, that process ought not distort the agency's program with a scramble for "quick fixes" nor punish the agency for its reluctance to accede to such pressures.

9. We note that bills are pending in the Congress calling for a White House conference on education before 1980. Such a conference might be a timely occasion to lay before the nation evidence of the continued success of our educational system and the strenuous efforts being undertaken to respond to the disappointments which have come to the fore in terms of "test score decline," "discipline problems" and concerns about "freedom of choice." If such a conference is convened, it is important that NIE be given a prominent role in shaping the agenda and identifying resources upon which the conference should draw. The Council volunteers its services to help prepare a conference truly responsive to concerns of the public.

10. Lastly, we dwell for a moment on the Council itself. We are, as an editorial in the April 1973 *Educational Researcher* noted, an experiment in Government as well as in R&D. At the time the editorial was written, many researchers were skeptical of the role we would play, and the value of it. Such concerns will no doubt surface again in the debates about a Department of Education. If kept at full strength and truly supported by the timely and competent assistance we have come to expect of the NIE Director and staff, this Council can provide Congress and the nation's principal Federal research agency (as well as the education and research communities at large) perspectives and steady direction necessary for this enterprise, especially in a time of heightened public concern about the accountability of public agencies. ☐

Chapter 2

The Council and Its Activities During the Year

The legislation which created the National Institute of Education in 1972, made the National Council on Educational Research (NCER) an integral, yet distinctive, part of the Institute. The Council is thus a core entity within the Federal Government; an independent, policy-setting body lodged within an Executive Branch agency. It is there for several reasons: to bring balanced and disinterested attention to a complex enterprise, to protect a vulnerable set of programs, to give guidance to the professional staff, to make sure that the work of the Institute is focused on important "researchable problems," to monitor quality and performance, to insist that knowledge be made available to those who can use it, and to advise elected officials of accomplishments and problems.

Congress clearly wanted the Institute, in addressing the tough educational questions which face the nation, to be guided by the needs and concerns of the public and the educational community across America. Thus, the Council also communicates these concerns to the Institute staff.

Policies and Priorities

One of the Council's first undertakings (in 1974) was to establish the priority areas that have guided NIE's programs, namely, basic educational skills; equality of access to educational programs; the work-readiness of young people and adults; educational finance and productivity; and dissemination of research findings. These concerns are now anchored in legislation. They provide a base for the specific initiatives set forth in the Director's program. Over the intervening years, more than 30 NCER resolutions have set policy governing NIE programs.

The Council's formal resolutions do not, alone, convey its views or its role in guiding NIE. Bi-monthly meetings with the Director, committee sessions, correspondence, reports of committees, members' inquiries and Council requests to the Director for information and discussion—these indicate Council interests and preferences, and so contribute to the staff's planning. Program plans and the Director's recommendations and actions often reflect the influence of the Council, which, in turn, encourages the Director to initiate discussions of issues, to solicit its views, to recommend policies, and to urge Council action. It is pledged to respond to such leadership and does so willingly.

Open to the Public

How does the Council tackle its responsibilities? It draws not only on the varied experience of its members but on outside expertise as well. For example, the Council commissioned an in-depth appraisal of fundamental research relevant to education by the National Academy of Sciences which was published in August 1977. (Termed a "landmark study" by Director Graham, the subject is specially featured in this Annual Report and is treated extensively on pages 40-63.) The Council has had, and hopes to expand, a lively give-and-take of ideas with education specialists and practitioners across the nation. It encourages educators, the public and the press to attend its bi-monthly meetings.

Another instance of soliciting outside views was the invitation to the National Advisory Council on Women's Educational Programs to address the Council last July. While applauding NIE's sensitivity to women's concerns in some areas, this statutory group cited shortfalls—such as a Basic Skills Group conference on math which was said to have failed to deal with the women's avoidance of math—and urged greater participation by women in educational research. (Changes proposed in NIE's organizational structure in September 1977, reflect a heightened awareness of such equity concerns.) We expect to engage in similar discussions with other groups.

The Council met six times last year. Except for occasional brief sessions on budget and personnel matters, all Council deliberations are open to the public in compliance with the Government-in-the-Sunshine Act. Procedures for submitting information to, and obtaining documents from, the Council are available from our staff office at the Institute.

The Work of the Council and Its Committees

The fifteen-member Council (at reduced strength this year because of unfilled vacancies) carries on its preliminary work by means of three standing committees: the Executive, the Program, and the Review and Reports Committees. After reorganization, individual Council members will once again be appointed to serve as liaisons between the Council and each of NIE's program groups. This arrangement can help the Council keep abreast of the Institute's accomplishments and problems. To the same end, the NIE staff briefed the Council on individual program areas and demonstrated the resources of the ERIC Clearinghouses and the NIE Library. In November, NIE Deputy Director Michael Timpane briefed the Council on the Institute's analysis of issues in student aptitude and achievement testing. A pilot version of the NIE-supported TV-film series "Freestyle" was screened for the Council; this series is designed to reduce pressures of sex-role stereotyping on the career aspirations of young people.

This year the Council continued its practice of having members appear at Congressional authorization and appropriation hearings to discuss the NIE program. Before the Institute's FY 1978 budget (accompanied by the Council's resolution of concurrence) was submitted to the Office of Management and Budget and to Congress, it, too, went through several stages of Council review.

The Executive Committee

During 1977 the Council completed an orderly analysis and codification of its policies and bylaws into a new Policy Framework. To assure a clearer idea of who is addressed in these resolutions, of what is being said and what is expected, the Executive Committee led an effort to classify NCER policies, by content and intent, under the following headings:

- general policy guidance,
- policies establishing program priorities,
- policies on resource allocation and control,
- policies on planning, conduct and evaluation of NIE activities, and
- policies on the Council's structure and operations (bylaws).

Past resolutions have been schematically categorized as well, and each annotated for present status and implications for ongoing NIE activities. Having consolidated its determinations to a single policy document, the Council is now in a better position to pinpoint policy gaps. Seen against this grid, imbalances between resource allocations and policy needs can be more readily identified.

To orient new members and provide a ready reference tool for all who sit on the Council, the Executive Committee compiled a handbook on legislation pertinent to NIE

and NCER and included all accumulated policies, bylaws, directives and priorities, as well as NCER structure, members and staff.

The Executive Committee also acted as a clearinghouse for proposals by other committees and helped them focus on general Council priorities.

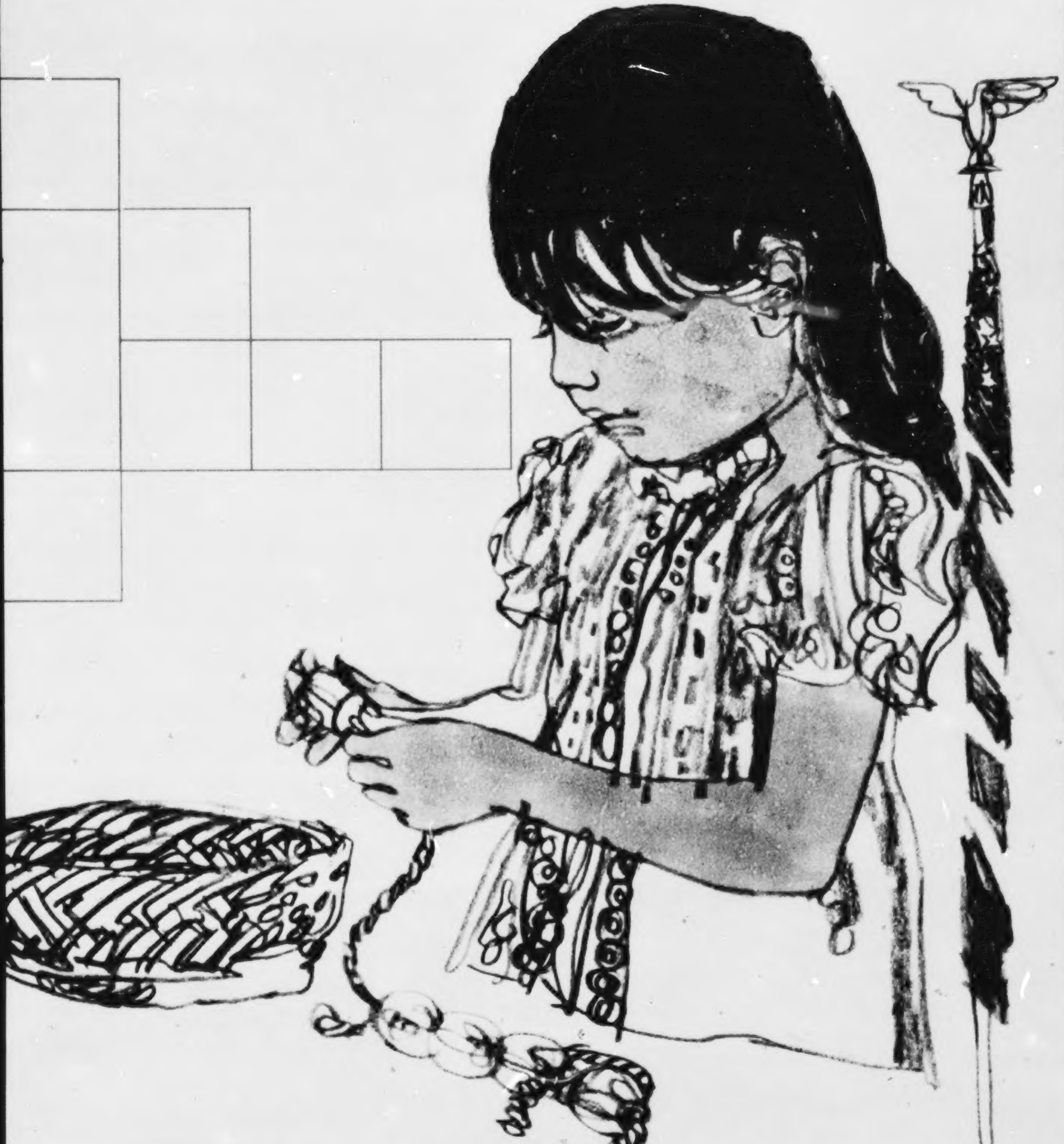
The Program Committee

The Council's policies on instructional program improvement (explained in last year's Third Annual Report) and on fundamental research were developed under the leadership of the Program Committee. For well over a year the Committee explored the question of fundamental research relevant to education, defined as "disciplined inquiry whose purpose is to understand why and how education takes place." The Council commissioned the full-scale study of that question which forms the basis of the fifth chapter of this report. The Council policy statement based on the study is discussed there.

The Review and Reports Committee

The Committee on Review and Reports is responsible for ensuring Council oversight of NIE as well as for producing the Council's Annual Report (of which 15,000 copies were distributed last year, many upon specific request) on the activities of the Institute and on education and educational research in general. To assist the Council in its review of NIE programs, the Committee devised a plan under which questions are submitted to an external review panel on each of the major programs of the Institute. The responses of the panel, together with the Director's comments, are reviewed by that member of the Council who has liaison responsibility for the program under review. Problems which merit further attention are reported back to the Committee or to the Council as a whole. When this rather elaborate, but necessary, procedure threatened to collapse during the past months of transition, the Review and Reports Committee took steps to revitalize it.

The Committee also reviewed the Institute's implementation of its policy on support of research and development institutions. Its report to the Council in May 1977 cautioned the Institute not to compromise high standards of quality for purposes of institutional maintenance; rather, NIE should carefully assess its efforts to assist educational laboratories and centers as they work to strengthen their capabilities, should examine these and other organizations willing to establish long-term relationships with NIE, and should give greater attention to the mission of building a more effective R&D network. ☐



Chapter 3

Director's Statement

During the 1970's we have seen a maturing of educational research in America, a new sense of mission and of security. Signs of this are seen in the colleges and the universities, in the major research centers, in the National Institute of Education, and most important of all, in the schools themselves.

Nearly every large school system now has a research director or an office for research. In-service training or staff development in the schools insures that teachers and those in the research community can interact on a regular and equal basis—not just under "experimental" circumstances. In the universities, while some status insecurity for educational research lingers, joint effort amongst university faculties from many disciplines is more common than before, and the long history of efforts by colleges and schools of education to be of real service to schools is producing results.

During the past year at the National Institute of Education we have seen a number of successful research efforts, including an outstanding example of genuine help to public policy (the Title I Study) and of aid to schools in dealing with pressing internal problems (the Safe School Study). In addition, the past year has seen publication of a study by the National Academy of Sciences, *Fundamental Research and the Process of Education*. This work, commissioned by the National Council on Educational Research, has guided the Council in its formulation of a policy mandating additional attention to fundamental research at NIE. Even more important, perhaps, the study marks the maturing of educational research and of attitudes toward the community that generates it. Little in the document calls up turgid arguments concerning alleged dichotomies between theory and practice, or hints of the historical tensions between "able" members of the arts and sciences professoriate and "second-rate" professors of education; nor does this paper minimize the importance of school practice as it lists its arguments favoring sophisticated attention to fundamental inquiry.

It is not, however, my intention to create here a laundry list of recent successes. I cite the emerging maturity and credibility of the educational research community partly because it has not always been thus. We cannot truly appreciate our present condition nor insure continued progress unless we have a full understanding of past problems. Three difficulties have characterized educational research in America during much of this century, each contributing to its low esteem, each reinforcing the notion that it has been inadequate or irrelevant. We must recognize these past problems if we are to capitalize successfully on the encouraging recent trends I have noted.

The first of the difficulties faced by those engaged in educational research has been a general willingness in our society to consider education primarily as a means towards an end, not as an end in itself. Traditionally, we have always believed that we could best defend the arduous educational process by promising that if someone were educated, valuable consequences would result. The classic example of this view was the one held by seventeenth century Puritan leaders, probably the staunchest proponents of education who ever peopled these shores. They contended that eternal salvation was dependent upon literacy and learning. A full understanding of the scriptures, preferably one gained through individual study and aided by pastoral instruction, was indispensable for salvation, even for the elect. In an era of substantial agreement about religious values and the importance of salvation, such an argument for education was a compelling one—it was certainly not a "researchable" question.

The nineteenth century analogue to the earlier Puritan conviction that education would lead to salvation was that education would lead to morality. Horace Mann was notably successful in convincing the skeptical in Massachusetts that the moral tone of the state would be enhanced by a publicly financed educational system in which all children of the community would be offered a rudimentary curriculum.

However, by the twentieth century, techniques of educational research had begun to evolve. When proponents for education argued confidently that it would lead to specific goals, those assertions could be tested, upheld or discredited by the emerging research community. The research design to determine eternal salvation or morality is elusive indeed! But it is easier to measure mobility. For instance, the conventional wisdom that extended educational opportunities would lead to greater social and economic mobility was first challenged by educational research.

Our tendency as a society to measure educational success on the basis of generalized social outcomes led scholars into an ungraceful position. The tone of their research was often negative, its purpose to prove that education was not doing what society claimed or hoped it would do.

When too great a part of educational research was devoted to reporting negative results, both the morale of individual researchers and the status of education as an enterprise suffered. Until we began to challenge the notion that education should by itself cure societal ills, education was always failing, and educational research always documenting failure. Gradually we have come to recognize that education is important in and of itself; it is not merely a means to an end. As a result, we have realized that we must not focus our research exclusively on the consequences of education for society. Instead, the primary reason we educate people is not for salvation, morality or mobility, but for literacy, the ability to read, write, manipulate symbols, and develop independent means of making judgments and determining actions. In the past we were reluctant to argue that literacy in this broad sense was adequate justification for the educational system. Now we devote less attention to the social impact of educational "outcomes" and more to the internal processes and problems of education.

This shift in focus is extraordinarily healthy, but we find, as we concentrate on the problems associated with insuring all of our population the highest possible levels of educational achievements, that we have not yet developed research designs and methodologies completely adequate to the complexity of the new questions we are asking. This is partly due to the second difficulty that has permeated much of the history of educational research: the "problem of disciplinary rigor."

There has never been a discipline of education; yet researchers have traditionally lived in university communities where status rewards have been dependent on identification with the arts and sciences disciplines. As a result, educational researchers have, for many years, struggled with the problem of trying to turn their field of endeavor, broad and ill-defined as it is, into an enterprise resembling what their colleagues would call a "hard" discipline. Not only have these attempts been unsuccessful, they have drained energies, wasted time, bored the intelligent and frustrated some of the most creative minds who have chosen to enter the field. Obsessed with status and insecure, educational researchers sought for methodological purity. Overly quantitative, they did not develop sufficiently broad research strategies. This legacy remains with us. We still see examples of subtle and important questions being addressed with research tools of insufficient elegance. But more examples of creative and flexible research design are emerging. While in no way wanting to diminish the quantitative sophistication which educational research has attained, I am pleased to see indications that the field is losing its tendency to be wedded exclusively to these techniques.

The third problem endemic to past educational research is related to the first two, but has independent roots as well. We have not been sufficiently bold or catholic or perspicacious in our selection of topics, partly because narrow quantitative methodology has dictated relatively narrow topics, and partly because we have been called upon to document failure more than to analyze success. The problem also exists because we have avoided too much William James' admonition that the educational enterprise is as much art as it is science, an admonition that NIE's authorizing statute recognized in 1972. To the extent that education is an art, we may need to reexamine many of the assumptions of our research and development strategies.

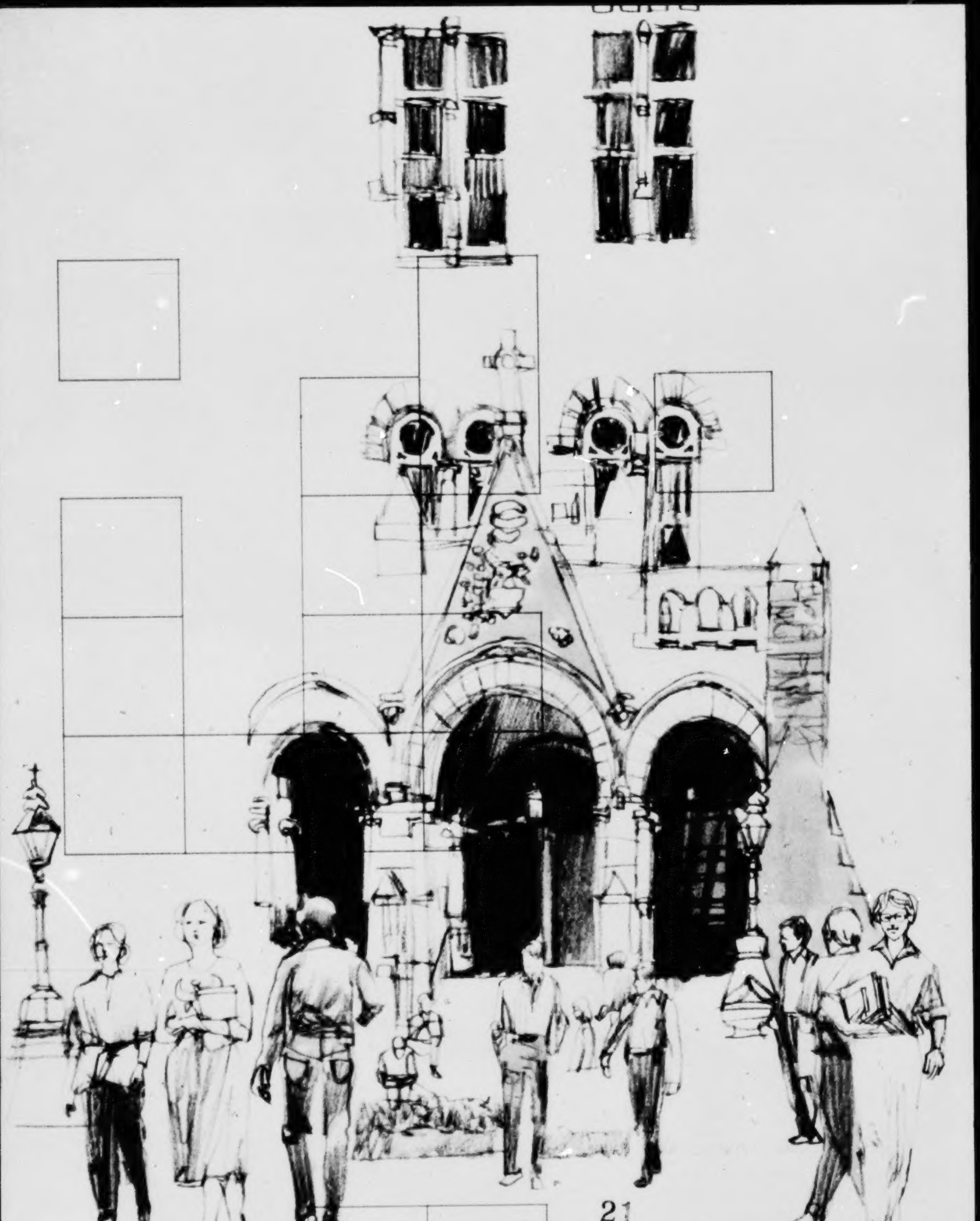
We must realize, more than in the past, that artists and craftsmen rely on intuition, accumulated experience and informed judgment as much as on rational analysis and self-conscious methodology. By suggesting that we must begin to build a new set of expectations and research postures if we are to be more successful in addressing the major problems of education, I do not mean that we should look for a single research paradigm to serve as a panacea; nor do I mean that we should abandon the methodological expertise and the substantive work done as a result to the pressures I have cited.

My suggestion is that we should not be so overwhelmed by the value of the scientific model that we ignore its limitations. In the past, an overemphasis on the scientific method has led us to prefer achievable to significant topics. Sometimes we eschewed topics that address complicated human issues, preferring to undertake less emotionally freighted ones. We should be wary of Thorndike's assertion that "All that exists exists in quantity and can be measured." Surely many of the problems for educational research are not laboratory problems, and our future directions must reflect these considerations. Such research will require greater intellectual risk-taking by scholars, but, when successful, the increased understanding will be substantial, and its importance to educational practice will increase.

Insofar as we did follow a scientific paradigm, we also tended to expect that improvement of our craft would flow from more perfect or more truthful theory about the craft.

Better practice would evolve from better theoretical structure. The topics we then chose to address were often designed to refine or embellish theory. We ignored those topics that successful educational practice suggested. We are not developing better ways to select subjects that relate directly to, and are generated by, practitioners themselves. One of the encouraging signs of our maturity is the increasing awareness that by observing and talking with, and lending ourselves to, our "authors," the educational practitioners, we can ask more savvy and sophisticated questions. That is but one aspect of NIE's commitment to keep the research that it supports inseparable from local practice.

My contribution to this Report is, then, one of relative optimism. I believe that I sense a growing awareness of the difficulties that have beset educational research in the past and an accompanying change in its conduct. This should be beneficial for us all as we pursue the difficult and complicated goals of assuring the highest level of educational attainment possible for all of our children. ☐



Chapter 4

National Institute of Education
A Year of Transition

This was a year of transition for NIE. With a new administration pledged to pay greater attention to education and a Director appointed by the new President, the Institute began to exercise the stronger mandate Congress had given it in the reauthorization legislation of the previous year. This report is on some of the major problems and events of fiscal year 1977.

Appointment of New Director

President Carter nominated Dr. Patricia Albjerg Graham as Director of NIE and, after confirmation by the Senate, she was sworn in on September 9, 1977. Dr. Graham has served as school teacher and counselor, trainer of teachers, and was most recently Vice-President of Radcliffe College and Dean of the Radcliffe Institute. At the Senate hearings not only was confidence in the new Director expressed, but a tone of continued Congressional support for NIE was evidenced.

FY 1978 Appropriations

The groundwork provided by former Director Harold Hodgkinson and Director Graham's presentation of the NIE program on the Hill contributed to a favorable appropriations bill which established a FY 1978 NIE budget of $89.6 million. This represents an increase of 28% over last year and the first growth in appropriated funds since NIE's beginning in FY 1973.

Mandated Studies

In previous years the Congress directed NIE to conduct studies that would provide information to legislators on the subjects of compensatory education and school violence. The Education Amendments of 1976 directed NIE to conduct a new three-year policy study of Federal and state vocational educational programs. The Institute began this work in FY 1977 to aid Congressional deliberations about legislation on vocational programs. It is expected that future legislation will call for other special studies to be performed by NIE for the Congress.

Laboratories and Centers

The 1976 amendments also reflected continued Congressional concern that the regional educational laboratories and research and development centers make effective contributions to solving educational problems under the leadership of NIE. Congress directed the establishment of a national Panel to review the lab and center operations and long-range plans, and to provide advice to Congress and the Director on their future operations. The Panel first met in September 1977, after the NCER had strongly urged immediate implementation of the Congressional mandate. The Panel completed an interim report promptly and has since provided guidance on current relationships between NIE and the labs and centers.

Reorganization

Soon after she came to the Institute, Director Graham called for studies of NIE's activities and organization. She decided that restructuring the agency would achieve important advantages for NIE. A major reorganization was approved by Secretary Califano on March 21, 1978. The number of program groups is to be reduced from six to three, and other organizational changes will improve attention to educational equity concerns and other NIE priorities.

Research Activities in NIE Priority Areas—An Overview of FY 1977

In 1974 the NCER mandated that NIE focus its research activities in six priority areas; in 1976 the Congress incorporated these within the reauthorizing legislation as five areas in which NIE is to concentrate its resources. NIE's research activities are sponsored through systems of contracts and grants awarded to institutions and individuals deemed the most qualified to conduct research in a given area; some of the activities of 1977 in each of the five areas are described below.

Improving Student Achievement in Basic Skills

The goal in this area is to sponsor research that will help improve the way children learn reading, writing and mathematics. NIE spent approximately $18 million on research to improve basic skills during FY 1977. These expenditures covered a broad range of research on literacy, teaching, measurement and methodology, and criteria for educational adequacy. Among the many programs designated to improve basic skills during the year are the following:

- ☐ NIE established an Institute for Research on Teaching at Michigan State University. This Institute brings researchers from several disciplines together with teachers to study successful classroom strategy, ways to help students learn to read better, and other research topics;

The Tables on the following pages reflect NIE Program funding by Priority Areas. Type of Activity and Type of Recipient. The fourth Table shows the number of Contracts and Grants Awarded by NIE, 1974-1978. All percentages are rounded. All Tables were compiled by the NIE Budget Division.

Table I — **Program Funding by Priority Areas 1974-1977**

Problem Area	1974		1975		1976		Transition 1976		1977	
	%	$M	%	$M	%	$M	%	$M	%	$M
Dissemination and Resources	10	6.3	10	5.9	15	8.4	32	6.0	22	12.8
Basic Skills	33	21.1	32	18.5	27	15.5	19	3.5	30	17.6
Finance and Productivity	22	14.3	28	16.4	22	12.6	18	3.4	20	11.3
Education and Work	25	16.2	22	12.8	20	11.5	22	4.0	14	7.9
Educational Equity	7	4.5	5	3.0	8	4.7	5	1.0	9	5.4
School Capacity for Problem Solving	4	2.3	4	2.1	8	4.8	3	.6	5	2.8
TOTALS	100%	$64.7	100%	$58.7	100%	$57.5	100%	$18.5	100%	$57.8

Table II — **Program Funding by Type of Activity 1974-1977**

Type of Activity	1974		1975		1976		Transition 1976		1977	
	%	$M	%	$M	%	$M	%	$M	%	$M
Research	12	7.6	4	2.3	10	5.5	22	4.2	17	9.7
Development	79	50.9	86	50.3	68	39.4	34	6.3	52	29.9
Dissemination	9	6.0	10	5.9	18	10.4	39	7.0	26	15.3
Policy Studies	.3	.2	.3	.2	4	2.2	5	1.0	5	2.9
TOTALS	100%	$64.7	100%	$58.7	100%	$57.5	100%	$18.5	100%	$57.8

Table III — **Program Funding by Type of Recipient 1974-1977**

Type of Recipient	1974		1975		1976		Transition 1976		1977	
	%	$M	%	$M	%	$M	%	$M	%	$M
Colleges/Universities[1]	29	18.8	26	15.0	37	21.3	21	3.9	33	19.1
Nonprofit Organizations[2]	54	35.1	57	33.6	39	22.7	30	5.5	45	26.0
For-profit Organizations	6	3.9	5	2.7	8	4.4	16	3.0	9	5.1
State and Local Education Agencies	6	3.8	11	6.7	13	7.2	24	4.5	10	5.9
Individuals	1	.8	—	—	1	.8	8	1.4	1	.8
Other	4	2.3	1	.7	2	1.1	1	.2	2	.9
TOTALS	100%	$64.7	100%	$58.7	100%	$57.5	100%	$18.5	100%	$57.8

[1] Includes all funds at R&D Centers

[2] Includes all funds at educational laboratories

Table IV Contracts and Grants Awarded by NIE (Excludes Transfer Funds) 1974-1978

Fiscal Year	Contracts #	Contracts $M	Grants #	Grants $M	Total # Awards	Total $M
1974	284	47.4	129	14.7	413	62.4
1975	325	54.2	45	8.1	370	63.4
1976[1]	374	63.2	164	12.6	538	75.8
1977	288	48.2	140	9.1	428	57.3
1978[2]	123	16.9	335	36.1	458	53.0

Excludes Field Readers and Purchase Orders

[1] FY 1976 figures include Transitional Quarter

[2] FY 1978 figures calculated as of 6/30/78

These figures were compiled by the NIE finance and data management division.

Table V Program Funding by Program Area (Dollars in Millions)

	FY 1974	FY 1977	FY 1978
Teaching and Learning	$42.6	$32.0	$36.0
Dissemination and Improvement of Practice	12.2	14.9	22.5
Educational Policy and Organizations	9.9	10.9	18.1
TOTALS	$64.7	$57.8	$76.6

NOTE: This Table reflects the estimated NIE budget for Fiscal Year 1978 under the reorganized program areas. Budgets for Fiscal Years 1974 and 1977 are shown for comparative purposes as they might have appeared under the new organization.

- The Institute sponsored a conference of educators on how research can help teachers strengthen students' writing skills. One result was a book on how writing competency is acquired;
- NIE and the National Science Foundation jointly sponsored a conference on uses of hand-held calculators in school mathematics instruction. Parents, teachers, mathematicians and researchers participated;
- After a national competition, NIE established a specialized Institute for the Study of Reading at the University of Illinois (Urbana-Champaign) to learn more about reading comprehension and how to teach it.

Improving Equal Educational Opportunity

Research sponsored by NIE aims to produce information on ways to improve equality of educational opportunity for all students, regardless of their race, language, sex or socioeconomic status. While this general mission is pursued through many programs, special activities concentrate on specific priority concerns.

NIE committed approximately $5.4 million to research on selected equity problems. Accomplishments during FY 1977 include:

- Establishment of a national clearinghouse to gather information on bilingual education from a network of 33 regional centers on bilingual education, serving all 50 states, and to make that information available to states and local education agencies;
- Presentation to the Secretary and the Congress of major reports from the Congressionally-mandated Compensatory Education Study and the Safe Schools Study;
- Completion of ethnographic studies on the dynamics of desegregated schools which establishes a broad data base for assessing variations in the desegregation process.

Overcoming Problems of Finance, Productivity and Management

The Institute aims to help states, school districts and schools reform their educational finance systems, and to make the quality and cost more equitable for students and their families. It seeks to increase the productivity and effectiveness of educational services by assessing current practices and developing innovative methods, and lastly, to develop and disseminate strategies for helping parents, students, teachers and school administrators design, implement and manage appropriate educational programs for their communities.

NIE provided approximately $14 million for research activities on finance and productivity in FY 1977. Achievements under that program include:

- Helping South Carolina, Missouri, Tennessee and South Dakota reapportion their state educational resources;
- Helping the state of Oregon implement a system of competency-based education in its public education system;

- Providing, through the National Conference of State Legislators, technical assistance and information to the legislatures of states that are revising their finance laws;
- Helping 12 schools in Oakland, California and Chicago, Illinois to apply research on school organization and problem-solving to improve their management;
- Supporting the publication of a book for school administrators on "guidelines for reorganizing schools" after surveying for two years the practices and procedures used in 200 schools in California. The materials are being used by the Association of California School Administrators in workshops throughout the state to train their members in the use of survey and analysis techniques developed by the project;
- Helping teachers in 10 schools in San Jose, California to develop and implement a process for involving staffs in school decision-making. The California Teachers Association is helping teachers in other school districts use these techniques.

Entering and Progressing in Careers

NIE-funded activities in this area totalled approximately $8 million during FY 1977. Accomplishments include:

- Development of a Career Decision-Making Program by the Appalachian Educational Laboratory that has provided 10,000 high school students and 1,500 community, junior college and university students with both exploratory experiences and extensive career information to prepare themselves to make career choices;
- Conduct of three pilot television programs aimed at reducing sex role restrictions on interests and aspirations. These programs were broadcast over public television in four areas across the nation representing over 100 school districts, and involved upper elementary school children, their teachers and parents;
- Preparation of materials to help schools teach skills that prepare students for occupational mobility in the changing work world. Workers in approximately 100 large industries with employee tuition refund schemes helped test new approaches to life-long learning plans.

Improving Dissemination of Research and Development Results

Activities in this area are designed to provide new understanding of ways knowledge is produced and is made useful. Efforts are mounted to improve the knowledge-resource base and the access to it, to provide improved capacity for using and advancing knowledge, and to strengthen links between research and practice. The program aims to improve the dissemination and use of knowledge on how to solve educational problems and to study, evaluate and improve the ways that institutions and individuals produce and use knowledge to improve education.

NIE supported approximately $13 million of activities in this area in FY 1977: Accomplishments include:

- Co-sponsorship with the Assistant Secretary of Education and USOE of a dissemination forum in which 600 state, local and Federal representatives met to increase collaboration and coordination in disseminating educational information;
- Involvement of 200 schools in testing a new R&D program to overcome local problems in career education and basic teaching skills;
- Awards to six educational laboratories and centers for a program to increase involvement of women and minorities in education;
- Management of a dissemination linkage training program for staff of 20 State Departments of Education and 100 regional educational service agencies;
- Grants to State Departments of Education improving their dissemination efforts.

Two Mandated Studies and Their Results

1977 was a year in which a number of NIE-sponsored projects produced important findings or products. Two of these were major national policy studies, mandated by the Congress, which produced their final reports during FY 1977. Two important development projects carried on in 1977 have reached the stage of nation-wide dissemination and diffusion. The Institute was able to see its efforts produce tangible results.*

Compensatory Education Study

NIE's Compensatory Education Study was begun in January 1975, in response to a Congressional mandate contained in the 1974 Amendments to the Elementary and Secondary Education Act. During deliberations preceding passage of these amendments, there was considerable debate about whether or not Title I had achieved the goals Congress intended when the legislation was enacted in 1965. Congress requested NIE to conduct a comprehensive three-year study of Title I. The Study was to address (1) the effectiveness of the current Title I program in improving the education of low-achieving children in low-income areas; (2) how the current funding patterns of Title I would change if the definitions of low income now used in the formula were altered; and (3) what would happen if counts of low-achieving children, as opposed to low-income children, were used for distributing funds.

This mandate clearly reflected Congress' frustration with earlier evaluations which failed to provide a full account of the program's services or to investigate alternative modes of operation.

Earlier evaluations had concentrated almost exclusively upon whether or not the achievement of "Title I" children improved. This was clearly an issue of central importance because improving student achievement was one of the program's primary goals. The NIE study went beyond exclusive concentration on achievement, however. Evaluating achievement alone does not give the Congress a full accounting of all program effects or of how well Title I operates.

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*Page 35 features a list of selected NIE papers and publications that have resulted from research activities in 1976 and 1977.

It is impossible to assess the program's effects on student growth without first documenting that the children being measured have actually received the special instructional service. The mandate required NIE to provide a full picture of Title I's funding patterns, services and administration, as well as its effects on student development.

The study examined the effectiveness of the current Title I program in light of the following four questions in order to assess its operation and to identify areas which need improvement:

- Funds allocation—Do Title I funds actually flow to places which Congress intended?
- Services—Are special services that can be considered distinctive, additional or improved actually provided to participating children?
- Student development—Does the program have any effect upon the achievement of participating children?
- Administration—Do administrators at the Federal, state and local levels share a common perception of what they wish to accomplish?

The study also investigated two further questions of significant interest to the 93rd Congress: What are the effects of altering the definition of poverty used to allocate Title I funds? What are the effects of using counts of low-achieving, rather than low-income, children to allocate funds to and within school districts?

In an interim report completed in September 1977, the Institute's Compensatory Education Project staff informed Congress that Title I, broadly speaking, was working as Congress intended it should. Testifying in October and November 1977, the project staff reported that:

- Title I is effective in directing funds to areas with high numbers of low-income children. Indeed, it found that Title I is more effective than many Federal and state aid programs in increasing educational expenditures at the local level.
- Title I funds are used to provide special additional services to eligible children.
- Title I does make an important contribution to the educational experience of educationally disadvantaged children.
- Title I aids the development of students receiving services, and has the effect of increasing their academic achievement.

Well planned, stable, compensatory instructional programs can indeed enhance student achievement.

The report discussed the alternative poverty definitions and the effects of revising the current index upward and of substituting other data for the National Census poverty estimates. Concerning the use of student achievement as the basis for funds allocation, the report provided information on the costs and feasibility of alternative methods of obtaining achievement test data, on the effects of funding distribution of achievement-based allocations, and on the effects in terms of students served and services provided of relying solely on achievement-based distribution. In general, the study found that substituting low-achievement data for poverty data as criteria for distributing Title I funds would be expensive, would raise complex problems of administration, and might not result in targeting Federal funds more reliably on the schools and pupils for whom they are intended.

Safe Schools Study

The Safe Schools Study, submitted to the Congress in December 1977, represents the first effort to collect extensive data on crime and misbehavior in the schools on a nationwide basis.

In recent years public attention has been focused increasingly on crime and violence in schools. Inquiring into the sources of delinquency throughout society, the Senate Subcommittee to Investigate Juvenile Delinquency has noted mounting school violence and vandalism. Yet comprehensive data have not been available to describe the nature and extent of school crime and the cost to the nation. The Safe Schools Study was undertaken by NIE in response to Congress' request that HEW determine the number of schools affected by crime or violence, the type and seriousness of those crimes, and how school crime can be prevented.

In response to this request, made formally in the Education Amendments of 1974 (P.L. 93-380), the Institute conducted a study designed to provide information for policy guidance to schools about ways to reduce crime and disruption. The study concluded that the risk of crime at school may be declining. Still, about 8 percent of the nation's schools have a serious problem with crime. Each month approximately 11 percent of secondary students and teachers are victims of thievery at the schools. Vandalism occurs in over 25 percent of all schools within a given month; the actual cost of school vandalism and burglary is on the order of $200 million each year. Most offenses are committed by students at the school where the crime occurred. Security devices and personnel can be effective in reducing school crime. The single most important difference between safe schools and violent schools was found to be a strong, dedicated principal who served as a role model for both students and teachers and who instituted a firm, fair, and consistent system of discipline.

A number of themes run through these findings. First, there is abundant evidence of a problem requiring policy initiatives. It needs to be recognized publicly and confronted squarely right at the site. Schools should pay particular attention to establishing programs and incentive structures, such as grades and honors, that recognize students for their efforts and achievements. Schools and communities should recognize the key role of the principal in troubled schools and give special attention to recruitment and training programs. Teachers and other school personnel need pre-service and inservice training to make schools safer.

It is hoped the study will provide information which can help guide actions to alleviate problems of crime and disruption in the nation's schools. For the moment, it has received considerable attention in local and national news media. It has already been acknowledged as the foundation of the DHEW position, made public recently by Secretary Califano, to bring the problem to national attention and help state and local officials seek its resolution.

Long Range Career Development Studies

Among research and development activities which achieved maturity during 1977 were NIE's Experienced-Based Career Education program and the Career Intern Program. Both are at stages of national demonstration and diffusion.

Experienced-Based Career Education

In recent years the Experienced-Based Career Education (EBCE) program has developed into one of the Federal Government's more promising educational ventures. During FY 1977, the program successfully negotiated the critical first phase—its transition from experimental status to available option, which school districts may implement, some with Federal aid, nationwide.

EBCE is an alternative approach to secondary education, designed to help bridge the gap between study and experience, between the classroom and the community. It combines learning activities from inside and outside the school into a balanced, comprehensive, individualized program for high school students. Subjects normally studied in the classroom are learned through the practical application of academic disciplines in the workaday world.

The program was begun by the U.S. Office of Education in 1971, as part of its exploration of different ways to provide career education to American youth. Four regional educational laboratories were selected to develop model programs. They worked from a common set of guidelines establishing major program outlines. But within the common framework, they developed individual designs to meet local needs and circumstances.

Since its inception in 1971, it has successfully completed a series of developmental stages. In 1975, a review by the NIE-USOE Joint Dissemination Review Panel judged the program "exemplary" and qualified for dissemination with Federal funds. A subsequent series of independent evaluations found overwhelming support by participants and positive student community outcomes.

Intervening years have witnessed further extension and field testing of the program. The school districts associated with the original pilot sites have substantially taken over the management and financial support of these programs. In addition, the original four sponsors established nearly thirty additional pilot sites for long-term technical assistance and testing.

By FY 1977, Experienced-Based Career Education was thus a well-developed and tested idea. The challenge which then faced the Institute was how to move the program into the "mainstream" of educational practice, transforming it from successful development into the implementation and dissemination phase. Less complex educational ideas have faltered at this stage. NIE and the program's developers needed to know what strategy or combination of strategies would make EBCE readily available and operable to school systems.

Examining this question has been the project's major activity for 1977-78. Some of the activities undertaken dealt with transferring financial support for EBCE from the Federal Government to state and local systems, developing a network of EBCE program sites, and diffusing the technical skills essential for local and state program planning, implementation, and evaluation. These themes have been pursued via three distinct dissemination strategies:

- Local commitment strategies which will lead to EBCE implementation in about 150 sites by the end of the 1977-78 school year;
- USOE Part D funding strategies which will lead to EBCE implementation in about 45 sites by the end of the 1977-78 school year; and
- NIE statewide implementation strategies which will lead to widespread EBCE implementation in four states by the end of the 1977-78 school year.

The local commitment strategy can be traced to the sites associated with the four regional educational laboratories which developed Experienced-Based Career Education. Each of these sites has taken over full responsibility for managing and funding its program. When these proved successful, the laboratories established 29 additional pilot sites which received long-term technical assistance in the years 1975-76. Several other sites that were interested in serving as pilot ventures, but for which funds were lacking, were given limited, shorter-term technical assistance by the laboratories during the next year. "Local commitment" efforts now underway look as though they may achieve EBCE implementation at more than 150 sites without Federal funds by the end of this school year.

As a direct consequence of EBCE's review and approval by the USOE-NIE Joint Dissemination Review Panel, OE allotted 50% of the Vocational Education Act Part D exemplary project funds to EBCE implementation. The OE will spend $20 million over the four-year period 1976-80, to demonstrate the EBCE program throughout the nation. Approximately 45 sites received Part D grants in 1976-77.

Under the statewide implementation strategy, NIE granted "seed money" in 1976-77 to four states to develop plans for statewide implementation of EBCE and to acquire technical capability to train educators in all aspects of the design, organization, and operation of the program. During the first year of this strategy each of the four (developer) laboratories worked with State Departments of Education in Illinois, Nevada, Texas and Wyoming. These states received technical assistance and training which they are now putting to use to make designated sites operational at the start of the new school year. The labs have also begun similar work with a second cohort of states. The Appalachian Educational Laboratory, for example, recently began providing implementation support to Iowa, Kentucky, Maryland and Wisconsin.

Career Intern Program (CIP)

FY 1977 was also a year of significant transition for the Career Intern Program (CIP), an NIE-supported alternative high school for youths who dropped out of school or are in serious risk of doing so. CIP was developed and tested in Philadelphia by the Opportunities Industrialization Centers of America from 1972 to 1976. When the program was reviewed in early 1977 by the DHEW Education Division Joint Dissemination Review Panel, it was deemed "exemplary" and qualified for special dissemination and implementation support through Education Division funds. NIE and the Department of Labor's Employment Training Administration signed an interagency agreement to develop the program on a large scale. Under this agreement, the program will be tested at four additional sites to further determine its effectiveness under various conditions and to learn whether its early success can be sustained, thus helping to increase the employment opportunities for urban youth.

The CIP was developed in response to a serious problem. In 1973 over 10 percent of American youth aged 10 to 24 had left school, before receiving a high-school diploma. The proportion of black youths dropping out was nearly twice that of whites. According to the Department of Labor, twice the number of dropouts from black and other minority groups were seen to be doubly disadvantaged; and the proportion of these youths who wanted jobs and could not find them was twice that of white youths without diplomas.

The Career Intern Program was developed to enable students to complete high school, acquire occupational knowledge, plan for a career and improve basic skills—in short, to facilitate a transition from high school to work or further education.

The experimental high school program consists of three phases. The first is directed at improving students' career awareness. That includes classes in English, Mathematics, Social Studies and Science. The classroom studies are keyed to the world of work, however, and provide occupational information as well as basic skills. The second phase exposes students to "hands-on" job experiences and to additional courses which fuse academic and career information. This phase stresses individual instruction, independent study and advanced courses in academic subjects. Students concentrate on the transition from school to work or to more advanced education during phase three. Students choosing the option of vocational or on-the-job training are assisted by counselors for six months after leaving the program; college-bound students are counseled for a full year after leaving.

The CIP was operated in an experimental mode between 1972 and 1975. 502 young people were enrolled in the program during this period. Most were blacks from inner-city high schools. They came from disadvantaged neighborhoods, from families of low educational attainment and low occupational status. They had little factual knowledge about careers and they were about four years behind national norms in reading and math achievement. Almost half had already dropped out and the remainder had been identified as potential dropouts.

The findings derived from this experimental period indicate that the CIP is an effective program for helping such young people complete secondary schooling and make a successful transition to work, higher education, and adult life. Specifically:

- ☐ A study comparing 286 young people who entered CIP between January 1974 and September 1975, with a control group chosen at random from CIP applicants showed: By December 1975, 67 percent of the CIP students, versus only 13 percent of the controls, had graduated or were attending school;
- ☐ About 44 percent of the CIP interns had received high-school diplomas and 23 percent were still at their studies, while only 7 percent of the control students had diplomas and only 6 percent were in school;
- ☐ Program participants developed improved career planning, information and decision-making skills, and increased utilization of career resources which are intended to help them choose and pursue careers;
- ☐ Program participants developed improved reading and math skills, though they continued to score below national averages.

A study of seventy-seven of the graduates, after they had been out of CIP for six months to a year, showed that 71 percent of the CIP interns were employed, in college or in technical school. Thus, one of the biggest differences CIP made was to enable youths to continue their education. The program cost about $248 per student, roughly the same as public vocational schools in the area and private high schools. Finally, the project evaluation identified eleven general and fifteen specific factors which may have contributed to the project's success. One is common to all sustained, successful programs: committed and capable leadership.

Under the Youth Employment and Demonstration Projects Act of 1977, the Department of Labor transfers funds to NIE to carry out further research on CIP; the Department is particularly interested in finding out whether the program, proven effective on a small scale, will continue to benefit low-income youths when implemented on a larger scale. Labor requested that NIE arrange for Opportunities Industrialization Centers (OIC) to demonstrate the replicability of CIP at four additional sites in order to test the effectiveness of the CIP more rigorously. In October of 1977, Labor's Employment and Training Administration and the National Institute of Education entered into an interagency agreement under which the Institute will carry out this research.

The agreement is for two years. This period is compatible with the Act's requirement that service to youths begin in new sites by January 1978. Labor has transferred $5 million to NIE to carry out the agreement.

New Approaches to Familiar Problems

Several projects suggest the range of NIE activities, the approaches used, and the subjects addressed:

Project "Freestyle"

Freestyle is a new television series for young people aged 9 to 12 that will be aired in the fall of 1978 over public television stations. The series consists of 13 dramatic episodes, each a half-hour long, encouraging children to develop attitudes and interests that expand their visions about careers for themselves.

The experiences of the teenage characters in these episodes are designed to start young viewers thinking about their role in the world of work. They focus upon traditional sex work roles and encourage viewers to avoid stereotypes, to explore their individual interests, and to develop their own lifestyles. Freestyle is designed to help both children and adults understand the restricting influences stereotypes have on people's interests, activities, behavior and career choices. It tries to encourage children of both sexes to feel comfortable expressing the full range of their interests and attitudes without being inhibited by confining roles and models.

The program is fully supported by NIE. The series and instructional materials are being developed by the Southern California Consortium, an organization formed specifically for that purpose. Its six members are public television station KCET of Los Angeles, the Los Angeles City Schools, the University of Southern California, East Los Angeles College, the Office of the Los Angeles County Superintendent of Schools and the Chicago-based Science Research Associates.

Ethnographies of Desegregated Schools

One approach to creating useful and relevant research programs has been expansion of analytic activities and lower-cost, shorter duration studies. A set of studies in line with this policy has recently been completed by the Desegregation Studies staff. Known as "Ethnographies of Desegregated Schools," these studies add an important dimension to the state of knowledge on "real life" dynamics of desegregated school settings.

Although much has been learned about school desegregation since 1954, there is still much concerning its dynamics and processes that has not been understood. As greater attention has been paid to desegregation, our theoretical and methodological sophistication about it has grown. Both the range and complexity of certain issues have become apparent. Ethnographic studies offer a means of deepening the understanding of this important and still perplexing field.

Ethnographic approaches employ anthropological methods to long-term and on-site observation. In the Desegregation Program and others, NIE has been making increasing use of this procedure. Experimental methods are essential to many studies and remain the principal research method used to contribute to fundamental knowledge and theory. Ethnographic observation and analysis, on the other hand, provide a powerful tool for developing data in highly complex, subtle environments which are needed for policy- or practice-oriented questions. They provide not only data for analysis but also an overall perspective on the subject studied.

The focus of the studies is upon individual schools and the environments they provide for children of different races to learn together. Papers produced as part of this program examine selected aspects of desegregated schools—school-community interaction, school-social relations, formal and informal patterns of staff and student interaction, the influence of physical space arrangements in schools—and the ways these affect the success or failure of desegregation plans. The papers, presented at the 1978 American Education Research Association annual convention, will be published by the Institute and should provide useful information for further research on desegregated schools and for school personnel designing and implementing desegregation programs.

Expanding the Research Community

Minority group members and women have been consistently under-represented in the conduct of educational R&D. Initial efforts to treat this problem, sponsored by USOE, were curtailed when reductions in the Federal budget forced shifts in Federal strategies away from training and technical assistance.

In the legislation establishing the NIE, Congress reaffirmed the national policy to provide an equal opportunity for quality education to all. The program to increase participation of women and minorities in educational R&D is a significant step toward the provision of equity under this Federal mandate.

In an earlier study of ways to improve the educational research and development network, it was noted that "a variety of persons (and other resources) are underused in the overall R&D effort." The report urged NIE to "strengthen its policies in support of increasing the participation of these groups in R&D." The National Council on Educational Research adopted this recommendation as a formal policy in 1975. Under this policy, the Director is expanding NIE's efforts to:

- Improve utilization of talent that currently is available for performing educational research and development, especially among women and minority group members who have already received advanced training;
- Increase the numbers of women and minority group members of outstanding ability and commitment who assume positions of leadership in educational research;
- Broaden the educational R&D agenda to include alternative definitions and approaches for priority educational problems; and
- Strengthen the credibility of research-based approaches to solving problems in education, especially for population groups that have been under-represented at professional and managerial levels in the educational R&D workforce.

After preliminary planning in FY '76, the Institute established a more ambitious program for FY '77 which prepared the way for:

- Nine planning conferences on special topics to be arranged with associations, interest groups, R&D performers, and state and local agency representatives; and
- Six experimental projects under the Laboratory and Center aegis to be selected through a grants competition to develop and test staff training and development strategies.

Public and scholarly interest generated through the widespread publicity and extensive field involvement in the planning process created a substantial flow of unsolicited proposals from the field. Five of these were awarded funds for FY '77. Special analyses were commissioned from two minority firms to assist in planning and providing information on the status of minorities and women in educational R&D. Continuation funding was provided for ten minority graduate students in sociology of education under a program supervised by the American Sociological Association. Activities to bring more minority group members and women into educational R&D will continue in 1978, based upon the groundwork established in FY 1977, with about $3 million specially budgeted.

Projects and NIE policies will emphasize improvements in the training, employment, and utilization of minorities and women in educational R&D; they will develop models for reduction of institutional barriers to minority and women's employment in educational R&D; and will focus on the needs of individuals for specific kinds of information and short-term training. Analytic studies will focus on the status of under-represented groups in educational R&D, the nature of the labor market, and barriers to equity in training, employment and utilization of R&D personnel. Finally, the program will begin the design and instrumentation phases of a major assessment project for improvement of the program itself.

These examples of projects underway or completed during FY 1977 indicate NIE's longstanding commitment to research that will improve equality of educational opportunity and improve educational practice. Based in part on the success of projects such as these, the Institute will continue to emphasize these goals after reorganization and will focus research increasingly on equity and practice improvement.

Reviewing Performance and Effectiveness

In order to perform its oversight function, the National Council on Educational Research needs information on the Institute's programs and activities from a perspective outside NIE. The Director, too, uses such information in program development. The Congress has also called for a special review of the Regional Educational Laboratories and R&D Centers. Formal processes have been established to provide such information, as described below.

External Reviews

In 1976 the Director of NIE established an external review process that would meet the Council's desire for such information and meet needs for feedback from and advice to programs. The first round of external reviews was carried out in FY 1977.

It was planned that external review panels would consider the research programs of each group at the Institute. A list of questions to be addressed to each panel was agreed upon by the Director and the Council. Panels would report to the Director, who, in turn, would report to the Council on the panels' views.

Review panels were made up of ten to eighteen persons, chosen to represent the diversity of the American education community. Membership reflected various races and ethnic groups, geographic regions, both sexes, the different types and levels of schools, teachers, administrators, academics and others concerned with education.

Five external reviews of the program groups were carried out in FY 1977. The sixth, which was to review the Education and Work Group, was overtaken by the reorganization process. (Instead, a conference was planned on the research agenda in the field of education and work.)

The reviews produced commendations and criticisms, which were transmitted to the groups and the Director. In January 1978, the Director reported to the Council that many recommendations had been implemented; others are still being considered. Some of the review panels' comments influenced the decision to reorganize the Institute and affected the aims the reorganization seeks to achieve. In addition NIE gained experience that will be used in planning future external review processes.

External reviews of NIE's programs will continue to be conducted because the information they have provided is valuable for the Director and the Council.

Laboratory and Center Panel

The Congress, in reauthorizing NIE, directed that a Panel be established to review Laboratory and Center operations. Selected from nominees proposed by educational organizations, it began work in September 1977. It has been charged to make recommendations for clarifying the relationships between NIE and the Laboratories and Centers, and for support of Lab and Center research and development programs in the future.

Working under severe time constraints and without benefit of first-hand or outside assessment of past work or project plans, the Panel produced an interim report with recommendations for stabilizing funding relationships between the Institute and the Labs and Centers and with other findings.

The Panel has reviewed the long-range plans of each of the 17 institutions. Its recommendations have focused on institutional issues. Members have not had an opportunity to visit the Labs and Centers or consider their plans in light of alternative resources and proposals. Such examination will take place, however, prior to completion of the Panel's final report in January 1979.

The Panel's interim recommendations were that:

- NIE move toward planning long-term relationships with 15 of the 17 Labs and Centers, though specific concerns were raised about each institution;
- Labs and Centers pay greater attention to developing clear institutional missions;
- Labs and Centers demonstrate more commitment to employment of women and minorities and to representation of women and minorities on their governing boards; and
- Practitioners play a greater role in deciding on research agendas.

New Program Organization and Management Strategy

Soon after arriving at NIE the new Director appointed three working groups, composed of people from both inside and outside the Institute, to examine three substantive areas: Teaching and Learning, Finance and Governance, and Organizational Strategies for Educational Research and Development. Their instructions were: (1) to review research needs in each area, (2) identify research activities going on outside NIE, (3) review what NIE was doing in those respective areas, and (4) recommend ways in which NIE might strengthen its research program.

Working under tight deadlines through the summer of 1977, the groups produced their reports. In sum, they pointed up a number of key problems:

- NIE's performance in improving educational equity had not been as strong as it should have been;
- The Institute's objectives were not sharply focused or clearly perceived;
- Coordination and communication within the Institute needed to be improved;
- The existing organizational structure gave rise to inflexibilities in the research program, some duplication, and insufficient emphasis on important subjects of study; and
- The Institute's capacity for long-term planning, beyond the annual budgeting cycle, was limited.

In the light of these findings, the Director decided that the benefits that could be gained from reorganization were substantially greater than the "costs" or disadvantages of such a move. In a memorandum to NIE staff about the reorganization, the Director stated: "While I do *not* think that organizational changes alone can greatly alter the performance of an agency, I do believe that structure and organization can be made to enhance rather than impede the achievement of our objectives."

The reorganization is intended to reinforce, not alter, the Institute's commitment to the research priorities established in the reauthorizing legislation of 1976. Its aim is to make the Institute more responsive to these priorities and to the policies established by the National Council on Educational Research.

The new organization is intended to offer a number of administrative advantages. The Director expects that (1) fewer units will mean less fragmentation and duplication, (2) substantive areas that have been overlooked in the past can receive new emphasis, (3) the missions of NIE will be more readily understood, both by outside observers and by staff, and (4) people working in related fields will be able to communicate with each other easily. The overall research program will be so shaped as to enhance educational equity and improve educational practice.

The New Organization

In November 1977, the Director appointed a Planning Task Force for Reorganization, which involved NIE staff in an intensive planning activity. The organization plan that emerged is shown on pages 32 and 33. It calls for the following organizational arrangements:

Office of the Director

The Director of the Institute is charged with full responsibility for implementing the legislation establishing NIE and all amending legislation. The immediate office of the Director includes the Deputy Director and the Deputy Director for Management. Under this leadership team of Director and Deputies are included the Planning and Program Development Unit, the Special Studies Office and the Equal Employment Opportunity Office. The Council staff serves as a liaison between the Council and Director as they meet the interrelated functions assigned to them by the legislation establishing NIE, and provides the Council with administrative and other support.

Program on Educational Policy and Organization

An important area where knowledge can be useful to practitioners and administrators in the field is educational policy, organization and finance. The Institute has sponsored relatively little research in this general area, especially on law, organization and finance as these factors relate to equity. The new research program supports research on formation and implementation of educational policies; institutional and social structures within schools; impact on educational policy, management practices and finance on equity of educational opportunity; revenue generation and distribution within state and local authorities; and, importantly, the whole field of law and education and the relationships between the two.

Research will be organized into three major areas:

- *Law and Public Management.* This area supports research on the impact of legislation and court decisions on education; major issues of educational policy; governments' roles in education and intergovernmental relationships; educational policy development processes.
- *Educational Finance.* This area manages research on revenue generation and distribution, their impact on educational equity; and patterns and effects of expenditures on education and ways to increase the effectiveness of educational expenditures.
- *Educational Organizations and the Community.* This area sponsors research on the governance and organization of schools at all levels; relationships between educational organizations and communities; and the integration of educational and social services in communities. Special attention is devoted to urban school systems and their problems, and to ways in which schools can provide equal opportunities when their communities are poor.

Program on Teaching and Learning

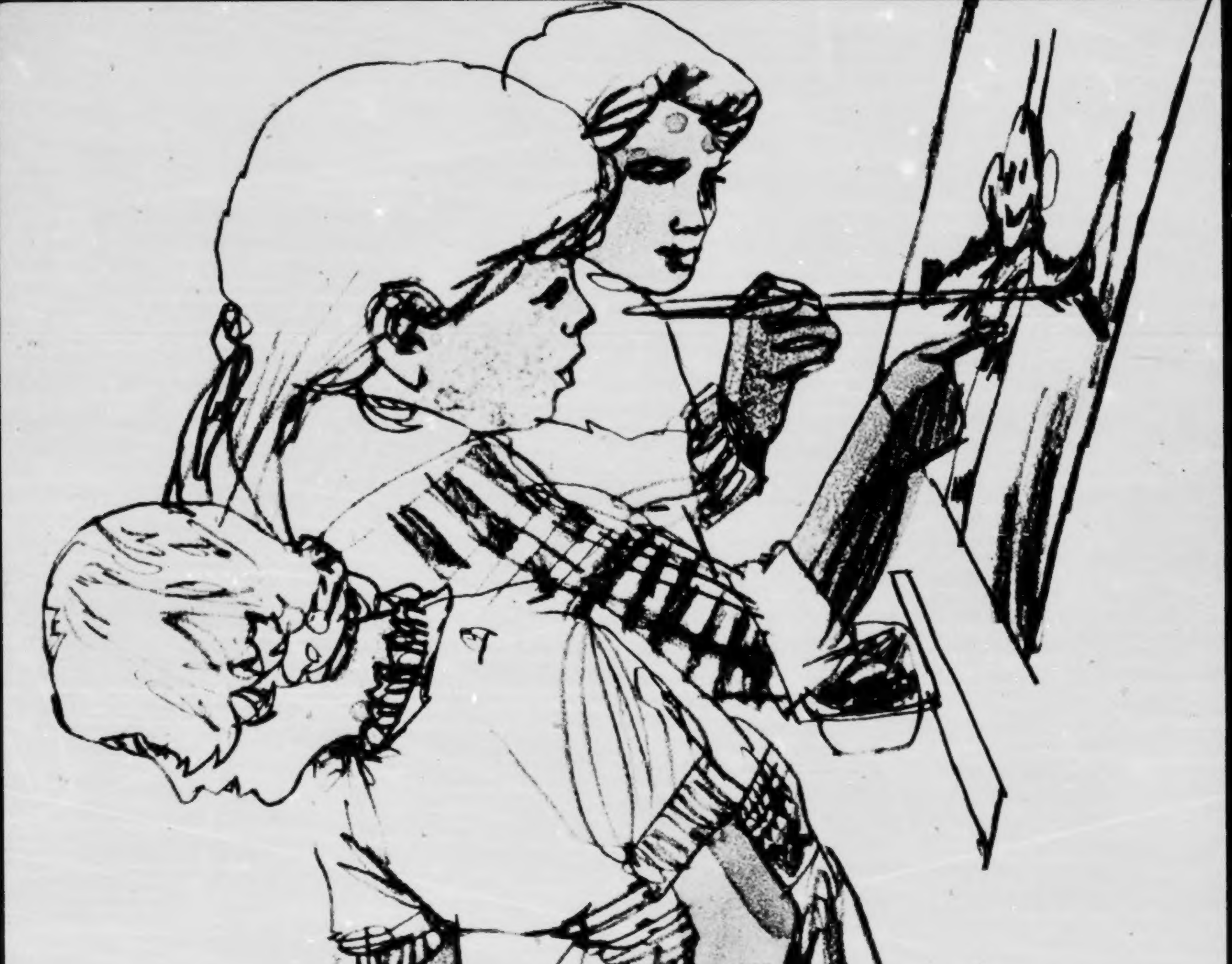
This program manages research on human learning and development, the process of instruction, and related subjects. It is concerned with the substance of what is taught, the practice of teaching and how to improve that practice, the testing and measurement of educational achievement, and with enhancing the opportunities for everyone—regardless of race, ethnic or language background, sex or social class—to obtain an education of high quality. Its scope spans all educational levels, formal and informal education, research and the dissemination of findings to the field. There are five major program areas within Teaching and Learning:

- *Reading and Language Studies* manages research on the essential basic skills of reading, writing and other language communication, and research on ways to improve equality of opportunities to develop these skills; research on teaching strategies for language and literacy instruction; and research on literacy development among bilingual students, including acquisition of English as a second language.
- *Learning and Development* supports research on development of mathematical skills, reasoning and problem-solving abilities, and on human development and the social processes that affect learning. Special emphasis is given to learning opportunities for minorities, women and the disadvantaged.
- *Teaching and Instruction* includes research on effective means of teaching, preparation of teachers and new instructional technologies. As with all units, equity is a major concern here as well.
- *Education in the Home, Work and Community* focuses on research on these other important environments in which learning takes place and on how out-of-school learning can reinforce formal schooling and be equally beneficial for all.
- *Testing, Assessment and Evaluation* manages research on the ways of measuring educational achievement, evaluating educational innovations, the fairness of tests and other subjects relating to testing and measurement.

Program on Dissemination and Improvement of Practice

This program concentrates its resources in three main areas of activity: (1) increasing the availability and usefulness of educational knowledge, (2) sponsoring research on ways that knowledge can be useful in improving educational practice and equality of opportunity, and (3) supporting regional activities designed to improve the communication of knowledge to educators and its use to improve learning opportunities. Each of these areas is important in responding to the Congressional charge to disseminate "far more dependable knowledge" to the educational community. Each area is supported by specific programmatic activities which are coordinated with NIE's other programs and serve the entire R&D enterprise:

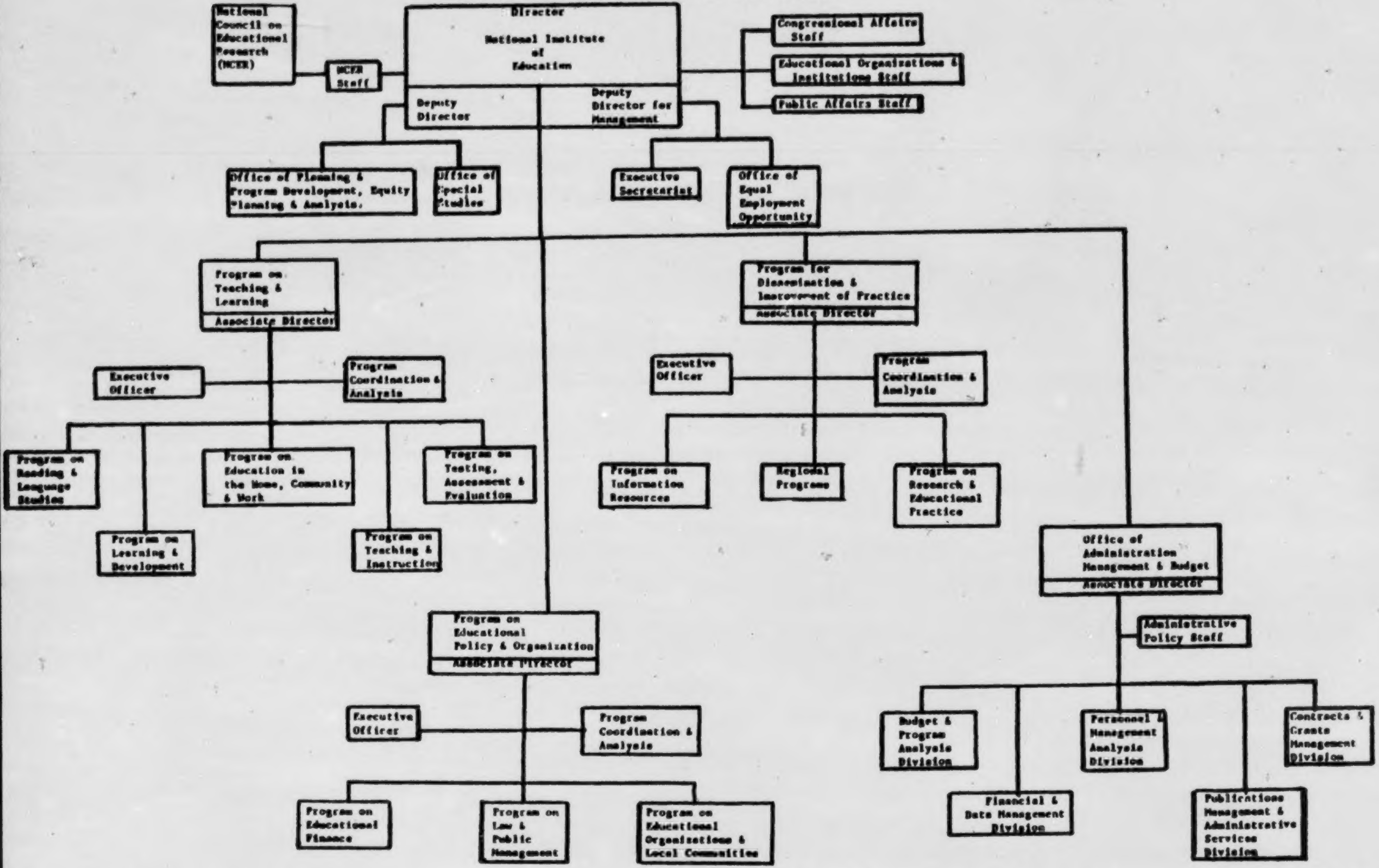
- *Information Resources* supports the existing national system of sixteen Educational Resources Information Centers (ERIC—which handles 10 million inquiries per year) and the development of state-level information services; it demonstrates the uses of new technology to communicate educational information.
- *Research and Educational Practice* supports research on how research findings—new educational knowledge—can help teachers and administrators improve education at the local level, both in its quality and equity of its provision. The utility of NIE's research programs and those of others depends on research information reaching people in a way they can and will use it.
- *Regional Programs* supports research and dissemination activities oriented toward regional problems and needs, with strong emphasis on programs for improving educa-



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Education Division

NATIONAL INSTITUTE OF EDUCATION



National Council on Educational Research (NCER)
NCER Staff
Director
National Institute of Education
Deputy Director
Deputy Director for Management
Congressional Affairs Staff
Educational Organizations & Institutions Staff
Public Affairs Staff
Office of Planning & Program Development, Equity Planning & Analysis.
Office of Special Studies
Executive Secretariat
Office of Equal Employment Opportunity
Program on Teaching & Learning
Associate Director
Executive Officer
Program Coordination & Analysis
Program on Reading & Language Studies
Program on Learning & Development
Program on Education in the Home, Community & Work
Program on Teaching & Instruction
Program on Testing, Assessment & Evaluation
Program for Dissemination & Improvement of Practice
Associate Director
Executive Officer
Program Coordination & Analysis
Program on Information Resources
Regional Programs
Program on Research & Educational Practice
Office of Administration Management & Budget
Associate Director
Administrative Policy Staff
Budget & Program Analysis Division
Financial & Data Management Division
Personnel & Management Analysis Division
Publications Management & Administrative Services Division
Contracts & Grants Management Division
Program on Educational Policy & Organization
Associate Director
Executive Officer
Program Coordination & Analysis
Program on Educational Finance
Program on Law & Public Management
Program on Educational Organizations & Local Communities

tional practice and increasing equality of opportunity.

Team Management

NIE's reorganization plan calls for "team management" of educational research projects. This plan, a familiar concept in both government and private research organizations, makes it possible to draw together "teams" of people with relevant skills to work on a research issue, regardless of where they are formally assigned in the organization. Such teams work together until their activity is completed. This arrangement, which has been used informally at NIE in the past, permits great flexibility in assignment of staff and permits the Institute to respond to changing needs, problems and priorities without reorganizing its formal structure. Such a flexible, problem-oriented style is well suited to NIE's mission and its professional staff and resources. Team management is expected to make NIE more effective as well as a more interesting and exciting place to work.

Next Year at the Institute

Looking ahead to the future, the Institute will continue to emphasize research to achieve the parallel goals—increasing equality of educational opportunity and improving educational practice. For example, during the review and execution of the FY 1978 budget, NIE research programs addressing educational equity were expanded or accelerated. These included a research and development center for bilingual education, a new grants competition for studies relating to equity, a legal studies program addressing issues of discrimination, and activities to increase participation of women and minorities in educational research.

Plans for FY 1979 concentrate new efforts on four areas:

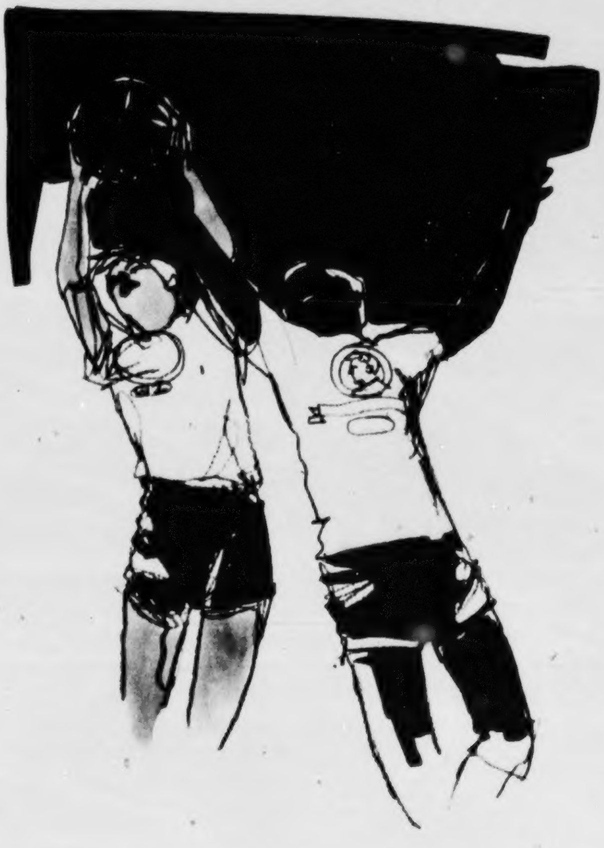
☐ *Student Achievement and Testing.* The Institute plans to continue and expand inquiries on the characteristics and uses of standardized tests. Initiatives proposed include regional conferences to extend the discussions begun at the NIE-organized National Conference on Achievement Testing and Basic Skills and a national clearinghouse to improve public understanding and use of tests, studies of how tests are now used and the effects of such use, fundamental research on student achievement in basic skills areas, targeted studies of the learning experience of disadvantaged students, and field studies to identify especially successful schools.

☐ *Improvement of Teaching.* NIE proposes a major program to recognize that teaching is central to the whole education enterprise and thus seeks to improve teacher effectiveness. Designated areas for study are: identification of effective teaching practices, teachers' professional development and how to improve their working environment, and the preservice training, selection and tenure of teachers.

☐ *Secondary Schooling.* NIE plans a set of studies designed to help rectify past inattention to this area and its critical problems. Studies will address adolescent development, the organization of high school instructional programs, and problems surrounding the transition from high school to work and to higher education.

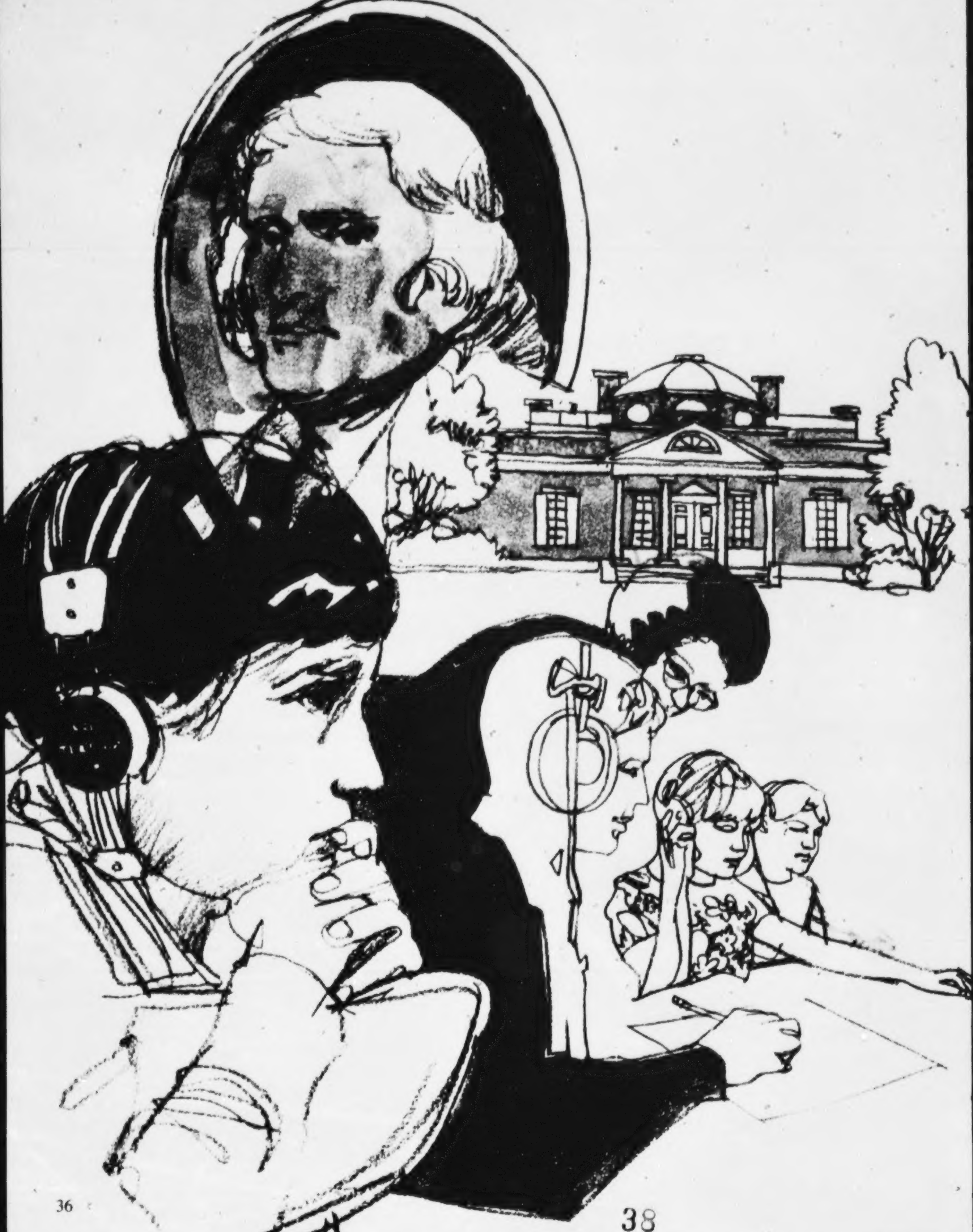
☐ *Revitalization of Urban Education.* Research on the urban public school has almost disappeared and the vital issues of urban education invite commitment of substantial Federal research funding. NIE is considering studies of excellent instructional programs in urban settings; research on urban school staffing, finance, and governance problems; and new efforts to improve the dissemination and utilization of research and development findings that might assist urban educators.

Taken in all, the past year has witnessed the Institute break much new ground, as befits a young agency, while continuing its work on essential projects previously begun. It took some new directions whose "homecomings" we shall be better able to judge in the next few years. ☐



Appendix
Selected NIE Publications and Papers 1976-1977

1. *School Desegregation In Metropolitan Areas: Choices and Prospects*
2. *Compensatory Education Services, A Report from NIE*
3. *Desegregation and Education Concerns of the Hispanic Community*
4. *Title I Funds Allocation: The Current Formula*
5. *Using Achievement Test Scores to Allocate Title I Funds*
6. Papers by the NIE Education and Work Group, December 1976-December 1977:
   - No. 3: *Sex Discrimination in the Selection of School District Administrators: What Can Be Done?*
   - No. 4: *Entitlement Studies*
   - No. 5: *Education and Job Satisfaction: A Questionable Payoff*
   - No. 6: *Paid Educational Leave: A Practical Way to Relate Work and Education and an Effective Way to Implement Lifelong Learning*
   - No. 7: *The Career Intern Program: Final Report* (2 volumes)
   - No. 8: *Women and Mathematics: Research Perspectives for Change*
   - No. 9: *Industry/Education Community Councils*
7. *Metric Guide For Educational Materials: A Handbook For Teachers, Writers and Publishers*
8. *Surveying Teachers' Centers*
9. *The Third Conference on Empirical Research in Black Psychology*
10. *Conference on the Educational and Occupational Needs of Black Women*
11. *Violent Schools—Safe Schools* (volumes I, II, and III)
12. *Improving Equity in Postsecondary Education: New Directions for Leadership*
13. *Minority Students: A Research Appraisal*
14. *NIE's Role In Curriculum Development: Findings, Policy Options and Recommendations*
15. *Educational Research: Limits and Opportunities Third Annual Report of the National Council on Educational Research*
16. *Proceedings: Conference on Corporal Punishment in the Schools—A National Debate*
17. *Demonstration Studies of Funds Allocation Within Districts*
18. *The Regressivity of the Property Tax*
19. *Alternative Measures of School District Wealth*
20. *Finance, Productivity, and Management in Postsecondary Education: A Research Agenda*
21. *Public Education in Sparsely Populated Areas of the United States*
22. *Program Plan for Fiscal Year 1977/1978: Education and Work Group*
23. *Sex Discrimination in the Selection of School District Administrators: What Can Be Done?*
24. *Federal Funding for Education Knowledge Production and Utilization: KPU Function*
25. *The Effect of Services on Student Development, A Report from the NIE*
26. *Federal Funding for Education Knowledge Production and Utilization: A Composite Estimate*
27. *Multicultural/Bilingual Division, Fiscal Year 1977-78 Program Plan*
28. *Administration of Compensatory Education, A Report from NIE*
29. *Higher Education Prices and Price Indexes*
30. *Report of the Conference on Needed Research and Development on Hand-Held Calculators in School Mathematics*
31. *School Desegregation: A Report of State and Federal Judicial and Administrative Activity*



Chapter 5

On Fundamental Research Relevant to Education

If a nation expects to be ignorant and free, in a state of civilization, it expects what never was and never will be.

Thomas Jefferson
from a letter to Col. Charles Yancey
January 6, 1816

Knowledge and the Improvement of Education

Wherever one comes out on Jefferson's politics, his conviction that mankind cannot at the same time be free and ignorant can hardly be faulted. So, taking the long view, one could begin by saying that the commitment to providing and improving education for the citizen began with the Founding Fathers. Nor is Federal concern with research in education entirely new; in 1867 Congress established a Federal Department of Education to collect statistics and facts ". . . as shall aid the people of the United States in the establishment and maintenance of efficient school systems." But it took another hundred years to evolve a policy on national support for fundamental research. Only in 1972 did Congress legislate a National Institute of Education into existence "to provide leadership in the conduct and support of scientific inquiry into the educational process."

When it comes to "popular" support of research findings, common wisdom long ago accepted the introduction of "improvements" into our lives via technological research. Social science achievements have permeated our thinking as well, of course, but far less demonstrably. Yet researchers find that social "inventions" now gain widespread acceptance in a surprisingly short time—ten to fifteen years, a period comparable to the time it takes to apply major technological achievements. Widely known and used social "inventions" are often the work of scientists and thinkers whose names are far less widely known. Indeed, their names evoke quite varying degrees of recognition. That these social inventions have informed and shaped our educational practice is not unknown to the layman, who has but to be reminded of the influences of past "greats" such as Pavlov, Freud and Dewey. Outstanding contemporaries such as Skinner, Piaget and Erikson have of course left their mark on educational practice, but their names are better known to the educator than to the layman. When it comes to recent researchers like Getzels, Woditsch, Bloom, Carroll, Atkinson, and Glaser, their contributions are known only to the initiate. In fact, the "shorthand" for their perceptions about mastery learning, "time on task," programmed learning, total instructional curricula, etc., is better known than they, themselves, are.

Fundamental research, then, is clearly a recognized and worthwhile investment; its influence on education, at least in the long term, is real and palpable. But Federal efforts in support of such research have not kept pace with the urgency of the needs of education in a rapidly changing world. After carefully weighing the findings of a major study, NCER concluded that increased support of fundamental research was required.

The story of how NCER came to adopt its new policy on fundamental research, one of the major achievements of its still young existence, starts back in 1975, when the Council passed a resolution calling for a thorough study of this area of NIE concerns. Accordingly, NIE commissioned the National Academy of Sciences (NAS) to undertake the work. In June 1976, the NAS, in cooperation with the National Academy of Education, assembled a panel of sixteen educators and scientists, chosen for their special competence and with regard to appropriate balance, from many of the classic research and fundamental academic disciplines.

From their individual expertise and common deliberations the Committee was, in effect, charged to arrive at judgments about basic research and Federal policy: How could the scientific foundations of education be strengthened? Is Federal support for such ventures adequate? What policies need to be changed to bring about such support?

The Report of the National Academy of Sciences

After examining the task, the Committee members decided that their investigation would not take the form of a scientific research project. "There is much that we have learned over the years and much that others have learned." They concluded that the need was to review their own knowledge and perspectives, and to learn from colleagues outside the Committee. The product of their deliberation was duly presented in August 1977, as the report on *Fundamental Research and the Process of Education.* * Termed an elegant document by one distinguished reviewer, the report is a lucid and thought-provoking contribution to the research policy issues with which the Council had been wrestling.

The Policy

Taking off from the NAS study, NCER in September 1977 adopted a statement of policy that puts fundamental research relevant to education at the center of NIE concerns. It directs NIE to realign its programs and budget accordingly and stipulates that 20 percent of Institute funds be used for fundamental research by fiscal year 1979, and 30 percent by 1985. This policy was arrived at after soliciting comments from leading educators, both about the report and about the NCER policy draft. All but a handful of respondents endorsed the policy, although some expressed reservations about specifying budget percentages. The emphasis placed on fundamental research and NCER's policy support of this view does not gainsay the responsibility of NIE, as the leading Federal research agency, to manage a broad and balanced range of basic research, applied research and development, and dissemination activities. Rather, the Council has concluded that if the serious neglect of fundamental research activities is not corrected, there will be damage to NIE's diverse research enterprise as a whole.

The Director of the Institute concurred with the new policy and in January 1978, Dr. Graham presented her plan to implement it. The actions she outlined were to be in general accord with the policy on matters of funding, research community involvement (with attention to unsolicited proposals), coordination with other agencies, availability of staff expert in fundamental research, and dissemination. Fundamental research was not to become a separate administrative entity and will continue to be supported through the problem-oriented groups into which NIE is organized.

The Process of Policy Making

For those interested in the process of Federal policy formulation, this exercise in leadership with the consent and participation of the governed merits a kind of "instant replay," to better understand the actual process. From the commissioning of the NAS report to its review by a select group drawn from the larger educational community, from the subsequent adoption of the NCER policy to the NIE program plan, there was a clear line of progress from thought to action.

Through this process of policy formulation, the Council sought to heed the many voices of education and thereby help build a constituency around a workable consensus. In arriving at its conclusions about fundamental research and education, the NAS Committee familiarized itself thoroughly with pertinent literature and solicited comment from colleagues as widely as possible. Once the report was completed, NCER, in its turn, consulted with a number of other scientists and educators over a period of several months before it concluded that: "NIE support of fundamental research relevant to education should be increased substantially if the Institute is to fulfill its potential for aiding major long-term improvement in education." The Council then drafted a resolution embodying this position which would effect its implementation by NIE.

Mindful of its role as representative of the public and the country's educational community, the Council sought an even wider sounding. It sent out the draft resolution together with the NAS report to 200 leaders in education for their views and comments. Generally, the replies received not only supported the thrust of the report, but a remarkable number of letters commented extensively on education and research in America today. For example, Professor Allen Newell of the Carnegie-Mellon University had this to say:

> ". . . Excellent science grows out of excellent research environments which attract and sustain very bright and dedicated scientists. NIE's problem is to build environments that are devoted to *its* areas of substantive interest, i.e., to the processes of education. Environments take time to grow, and require resources and freedom. Each of the dollars NIE spends on research should be seen not only as a purchase of some immediate research but as an investment in building and sustaining a research environment. Most of the good things that NIE will buy with its research dollars in 1978 will be the results in 1988 by some scientists who were graduate students in 1978, and got hooked on devoting a lifetime of thought and work on understanding the nature of education and learning. Attention to this investment aspect will help NIE to avoid some paths that will never cumulate (i.e., scattering small amounts of funds widely, switching areas too rapidly, hounding investigators for immediate relevance, dribbling the funds out in short-term bits to maintain central control). This is not a counsel of non-critical disbursements of funds. If the senior investigators do not seem capable of building excellent research environments that have the educational process as the central concern, then abandon them and

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> get some new ones you can trust. But get yourself some long-term research environments."

These and similar views served to refine the policy resolution actually adopted by the Council on September 16, 1977.

The NCER Policy on Fundamental Research (Adopted 9/16/77)

To ensure that fundamental research is a major part of the National Institute of Education's plans for addressing the educational needs identified in its statutory mandate, the Institute shall develop its programs in accord with the following guidelines:

I. Definition

Fundamental research in education is disciplined inquiry whose purpose is to understand why and how education takes place. In fundamental research, the investigator is concerned primarily with gaining a fuller knowledge or understanding of the subject under study.

II. Allocation of Funds

A. At least 20% of the Institute's funds shall be used to support fundamental research relevant to education by FY 1979, and by FY 1985 this shall have increased to at least 30%.

B. An important part of NIE support for fundamental research shall be through grants for projects conducted by individual investigators or small groups of investigators.

III. Research Community Involvement

A. The major purpose of research supported under this policy shall be to extend the knowledge gained through previous or current educational research or to explore areas where knowledge is lacking and research is needed. Since those who are most familiar with such areas of research are investigators in the field, the Institute shall, to the maximum extent possible, rely upon their assistance in identifying research needs and research to be supported. This assistance should include, but not be limited to, submission of unsolicited proposals, participation in developing guidelines, and review of proposals by groups of highly capable investigators (with multi-disciplinary and cross-disciplinary membership), including investigators close to educational practice.

B. As part of the continuing external review of NIE, the scholarly quality and balance of its fundamental research programs shall be evaluated by outside investigators.

C. The Director shall seek to work with all major research associations and organizations whose members may be engaged in fundamental research related to education, to accumulate knowledge about such research and to coordinate the Institute's programs with such research.

IV. Coordination

The Director shall seek through the Federal Council on Educational Research and Development and other means to coordinate fundamental research relevant to education supported by Federal agencies, to identify areas of fundamental research which should have greater support by NIE or another Federal agency, and to stimulate fundamental research in such areas.

V. Use of Research Results

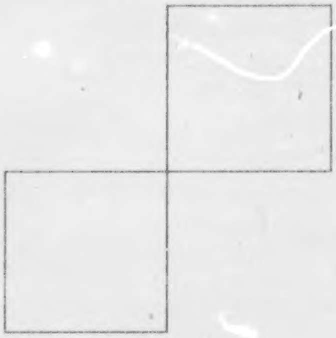
In concert with the Institute's support for fundamental research work and the Institute's efforts to involve the research community in this work and to coordinate its work with other agencies, NIE shall seek to report effectively to researchers, educators and educational policymakers the results of fundamental research, and to help them utilize such results in formulating research plans, educational programs and educational policies.

VI. Staff Responsibility for Fundamental Research

Because the NIE staff is essential to the implementation of this policy and the support by NIE of high quality research, the Director shall insure that within NIE there is a substantial number and proportion of staff members who are very knowledgeable about fundamental research, have ready access to the research community and are respected by its members. These staff members shall be consistently involved in decisions about the overall NIE programs and in the management of fundamental research programs.

VII. Reports

Initial plans for implementation of this policy shall be conveyed within 60 days, including resource allocations and management strategies. Similarly, by January 1, 1978, the Director shall present to the Council for its concurrence a general plan for implementation of this policy through 1985. The Director shall include in each annual report to the Council a review of the Institute's fundamental research work and efforts to improve it, and shall present to the Council as part of the budget planning process an analysis of options for support of fundamental research under this policy, including targets for the amount and proportion of funds which might be thus allocated.



Introducing *Fundamental Research and the Process of Education:* A Report to the National Institute of Education from the National Academy of Sciences

Chapter 1 of the Report defines fundamental research in education ("disciplined inquiry whose purpose is to understand why and how education takes place") and the objectives of the study. Chapter 2 deals with how research works its way into educational practice. Chapter 3 looks at the contribution fundamental research has made to understanding and resolving publicly-perceived education issues. Chapter 4 provides a history of Federal policy on fundamental research, and gives a broad picture of how government agencies now conduct and support such research. The final section of this report recommends:

- an increase in the proportion of the Federal investment in educational research and development designated for fundamental research;
- a change in policy toward more careful assessment of what is known and what must be learned before solution-oriented programs are undertaken;
- that more active investigators be included in the planning and program review of all basic applied research efforts in education;
- that the mission of NIE be broadened to include sponsorship of fundamental research on learning throughout life and in the many settings in which education occurs;
- that NIE adopt personnel policies that will facilitate the staff's knowledge of research and of the programs for research; and
- that the National Science Foundation establish a strong program of support for fundamental research related to science education.

Because it stands at the nub of the question—Why and how is fundamental research relevant to education?—the second chapter of the NAS study is reproduced in full on the pages that follow. The chapter describes the process of diffusion: how fundamental research works its way into educational practice; indeed, how it determines what education is and is good for. The report aptly illustrates the filtering of ideas from research into popular thought by juxtaposing citations from the 1946 and 1968 editions of "Dr. Spock" (see pages 45 and 46) relating these to the findings of fundamental research available to the author. The subtle transformation of advice to parents on understanding and rearing children may come as a surprise to some.

A better understanding of this diffusion process could help inform decision-making by legislators, government agencies, and researchers as well as educators.

NIE had asked the Committee to articulate how fundamental research makes a contribution to education. This led the Committee into considerable discussion and study of two questions: How does education improve? How does one define a "contribution" from research? The NAS Committee grew increasingly concerned, as it studied the testimony of government officials before Congress and talked with Congressional staff and others, that the impact of fundamental research on education seemed seriously underestimated. "We therefore undertook to examine a subtler and deeper vein of transmission from knowledge to education. We believe that educational change is slower, more subtle and more complex than usually envisioned, and that one of the most important influences that fundamental research has on education comes through diffusion rather than dissemination. . . . Ideas from basic research flow gradually and in complex ways to the educational community, citizens, parents and students. These ideas affect not simply educational techniques but the way people think about education, the criticism and enthusiasms they have regarding it, and the aspirations they hold for themselves and others. Some of this influence can be foreseen, roughly, in fundamental research as it progresses, but much of it cannot."

In the third chapter of the report (reproduced here on pages 47-63) the Committee sets out a series of eight examples of fundamental research topics which illustrate how research sheds light upon basic educational processes. A later chapter cites *Sesame Street* as another educational application that draws on the findings of basic research: While the program is "not the final answer to early childhood education, the children who watch it experience significant cognitive gains." Winner of an American Psychological Association award, *Sesame Street* is properly categorized as an applied undertaking. However, the program provides some excellent examples of the many ways in which Federally-supported fundamental research can inform and improve practice, and the ways in which work on an applied problem can, in turn, advance fundamental inquiry as well:

"1. In a series of workshops held to help producers and writers better define their audience, basic researchers provided a picture of the average four-year old child's mental development, worldly knowledge, family interactions, fears and interests. This image was influential in determining the topics of skits, the degree of repetition, and even the use of special effects. For example, research since Freud has determined several ways of helping children with sibling rivalry, and these made the basis for several scripts . . .

"2. The producers of *Sesame Street* were very concerned about specifying a set of objectives. They collaborated with researchers to design a list of behavioral goals for the program. . . . This work, heavily influenced by methodological advances in behavioral science that have occurred during the last fifty years, was an important factor permitting evaluation and assessment of the effects of the program on children.

"3. Research on children's responses to *Sesame Street* programs was performed throughout the show's development. This research, at first intended as an evaluative and sorting mechanism, turned up some findings of fundamental importance. It was discovered, for example, that previous laboratory research on children had somewhat underestimated the abilities of children, especially their attention span and memory."

Before we turn to the report itself, it is appropriate to acknowledge and thank the individual members of the Committee on Fundamental Research Relevant to Education: *Sheldon H. White, Committee Chairman (Department of Psychology and Social Relations, Harvard University); Merle L. Borrowman (Dean, School of Education, University of California at Berkeley); Remi P. Clignet (Department of Sociology, Northwestern University); John P. Crecine (Dean, Social Sciences and Humanities, Carnegie-Mellon University); Donald C. Davidson (Department of Philosophy, University of Chicago); James G. Greeno (Learning R&D Center, University of Pittsburgh); Alex A. Inkeles (School of Education, Stanford University); Philip W. Jackson (Department of Education, University of Chicago); Eleanor B. Leacock (Department of Anthropology, City College, City University of New York); Sara L. Lightfoot (Graduate School of Education, Harvard University); Amado M. Padilla (Department of Psychology, University of California at Los Angeles); John W. Porter (Superintendent of Public Instruction, State Department of Education, Michigan); Roy Radner (Department of Economics, University of California at Berkeley); Sandra Scarr (Institute of Child Development, University of Minnesota); Richard F. Thompson (Department of Psychobiology, University of California at Irvine); and John G. Truxal (School of Engineering, State University of New York at Stony Brook). Staff included: Sara B. Kiesler (Study Director), Charles F. Turner (Research Associate) and Benita A. Anderson (Administrative Secretary).*

From *Fundamental Research and the Process of Education*

Chapter 2: Fundamental Research and Education

Ideas about the relationship between fundamental research and education are commonly limited by a stereotypic view of what that relationship is. The stereotype can be described as a dialogue between a research psychologist, assumed to be a university professor, and a classroom teacher. Using the results of research, the professor advises the teacher how to teach. That stereotypic view of the connection between research and education generally assumes that the knowledge of greatest value to educators specifies, at least ideally, a set of pedagogical "do's" and "don'ts," and that the prime consumer of that knowledge is the classroom teacher. These assumptions have been widely held since the development of psychology as a science; they were a force in the creation of many schools of education and guided early educational research. Their popularity is understandable, for given the subject matter of psychology, it seems reasonable to expect it to be of direct benefit to persons whose occupational concerns are interpersonal. And yet, they are unwise assumptions, for they tend to act as a set of blinders, closing off a fuller view of what education can gain from research.

What is needed is a breaking out of the stereotypic view. The results of research and the practice of teaching are related in many more ways than as a dialogue between a psychologist and a teacher. First, the research side of the dialogue includes representatives of all the social and behavioral sciences and some of the humanities. Each relates in a fundamental way to the complex process of education. Physical and natural scientists should also be represented, for they contribute much to what educators teach.

Second, the teacher's side of the dialogue includes administrators, school board members, textbook writers, and all kinds of educational specialists as well as the state and federal legislators and other policy makers whose decisions help to shape the educational system. The case of educators grows quickly, for the concept of education involves far more than schooling, no matter how close the pairing of education and schools in everyday thought. Families educate, as do peer groups. Education goes on in churches and work places, in libraries and museums, and in front of movie and television screens. Any discussion about the relationship between fundamental research and education cannot be restricted to what goes on in schools and classrooms. It must break out of those boundaries if it is to treat the panoply of settings in which people become educated.

Having enlarged the cast of characters, however, we are still faced with a metaphorical dialogue that does not do justice to the relationship between research and educational practice.

There is no army of educational practitioners expectantly waiting to hear what the fundamental researchers have to say, nor is there a corresponding group of researchers. The truth is that most practitioners do not turn directly to researchers for advice, nor do most researchers offer it. The two groups talk more among themselves than they do to each other—and so they should if they are to do justice to their respective tasks. The metaphor does not jibe with the facts.

Introducing a third party to the dialogue, whose job it is to facilitate communication between the first two, might improve the usefulness of the metaphor. This group, the "disseminators," would include the popularizers, the translators, the journalists, and the reporters, who put the writings of the fundamental researchers into a form that is useful to practitioners. Professors of education who extract practical implications from work that appears not to have any may also act as disseminators.

The introduction of disseminators may add a touch of realism to the dialogue, but it does nothing to free us from the limitations of the belief that the ultimate contribution of fundamental research, from whatever source, is to tell the practitioner how to teach. To escape from the constraint of that belief, we must turn instead to thoughts about thought itself, particularly those of educational practitioners. The goal is to find some way to describe in general terms the possible linkages between research, on one hand, and the practitioner's world, on the other.

Conventionally, we think of practitioners as doers, people who apply skills and knowledge to the solution of practical problems. It follows from this view that to help practitioners is to influence their way of doing, to influence their actions, in settings in which they work. Hence, we come to the conclusion that the results of research (or for that matter, any other activity purported to be of value to practitioners), leave their traces in some modification of that activity we call "practice."

This view of the practitioner is too simple. Certainly, practitioners have changed and improved what they do as a function of what scholars and researchers have said. Sometimes those changes have been dramatic and the lines of influence direct. Quite often, however, the shifts in practice are caused indirectly—their scholarly roots buried in a tangle of causal agents that include public opinion, political expediency, and practical necessity. In short, the conventional view of practitioners and how they change lacks subtlety.

The conventional view has another, more important weakness: It fails to acknowledge the special perspectives of practitioners. In so doing, it obscures what stands to be changed other than the practitioners' way of doing things. We need a framework within which to discuss the approach of practitioners to their profession—their manner of thinking about what they do. We find it helpful to discuss the perspectives of educational practitioners in terms of four groupings: (1) a view of reality, (2) a vision of the achievable, (3) know-how, and (4) a commitment to act. Each of these constitutes a region of influence—a set of ideas, beliefs, and opinions vulnerable to change. Fundamental research relevant to education is but one set of forces—though an important one, we believe—contributing to changes in each of these groupings. Even as heuristic devices, the four groupings require a much fuller elaboration than can be given here, but we present a sketch of their meaning.

"A view of reality," as the phrase is used here, refers to the educational practitioner's way of seeing the world, together with the language used to talk about that world. It also refers to the relative importance attached to what is seen and talked about, the notion of valuing. In the most general terms, then, it contains the practitioner's answer to the question of what is real and what is important, insofar as that reality pertains to educational matters.

To a large extent, the practitioner's view of reality is commonsensical and shared by us all. All of us, if called upon to describe the contents of educational settings, would be quick to identify teachers, students, textbooks, and most of the other physical paraphernalia commonly found there. We would also claim to see that students differ from one another in their psychological makeup, that teachers carry certain responsibilities, and that some textbooks are better written than others. Yet even these shared perceptions, these common facts of life, differ in salience for those who are practitioners and those who are not.

In addition, even more specialized ways of seeing and speaking, which educational practitioners do not necessarily share with the rest of us, tell us something about how they see the world. Words like overachievement, hyperactivity, cultural deprivation, and reading readiness stand for a way of looking at things that sets their users apart from others.

The manner by which practitioners acquire their view of reality is as complicated as the view itself. Part of it doubtlessly derives from the common events of life, a portion is surely attributable to professional training, and another to professional experience. The question of how fundamental research contributes to this view is in itself worthy of serious investigation. For example, one might trace the roots of the remarkable change in views of gifted pupils that educators have undergone. Having abandoned the widely held misconception of the gifted as socially immature, physically weak, and prone to insanity (a view challenged by the research of Hollingworth and Terman, for example) practitioners began debating the merits of skipping grades, special classes for the gifted and talented, and various means of challenging their brighter pupils. Even without such an investigation, however, we can readily see that concepts of social class, intelligence, bureaucracy, ethnicity, cognition, and others used daily by practicing educators had their origin in the work of scholars and researchers or have had their meanings modified by that work.

"A vision of the achievable," as the term implies, refers not to what is, but what might be. It encompasses a view of the future, expressed in terms of purposes, goals, objectives, or aims. All purposive action implies such a vision. A vision of the achievable includes such narrowly defined goals as curriculum objectives of the sort found in lesson plans and teacher guidebooks, of course, but it also embraces vaguer hopes and grander expectations, including aspirations sufficiently broad in scope to shape policy and to inspire action. When educators speak of producing good citizens or helping to erase social inequities, they are expressing a portion of this vision.

As is true for the educator's view of reality, the sources of these visions of the achievable, large and small, are rooted in a causal network too complex to unravel completely, yet changes in that vision have occurred over time. It is now thought, for example, that far more people of all ages and stations in life stand to benefit from formal schooling than was thought to be so a generation or two ago. This belief was bolstered by fundamental research: "The quality of intelligence can be modified." "Our inner-city schools are not 'hopeless'." "The severely retarded can be taught." Fundamental research contributing to these expectations has included animal and human studies of deprivation, social psychological studies of children's attitudes and self-esteem, family interaction and prejudice, and investigations of environmental disadvantages and of childhood in other countries.

Work on the remediation of serious physical and psychological handicaps has inspired, in the last fifty years, an entirely new branch of educational endeavor and a willingness to spend time on people who in earlier generations were neglected. The kinds of research and scholarship that revealed the conditions of the underprivileged in this country and throughout the world have served to intensify educational efforts to overcome the devastations of cultural and social impoverishment. Each new advance in understanding of how the mind works, each contribution to thought that serves to deepen the appreciation of social justice, has the potential of altering educational vision.

"Know-how" is an old-fashioned phrase that means craft, technique, procedure, plan of action, method. In addition to seeing the world in a certain way and extending that sight into the future in the form of goals and objectives, educators must be prepared to act. They must know what to do to attain the goals they envision. When people seek to understand what fundamental research and scholarship might contribute to the teacher or the school administrator, know-how tends to get exclusive attention.

Educators, however, need more than a set of procedures for carrying out their work, crucial though such procedures might be. Traditional concern with translating the outcomes of research into a plan for action is not so much wrong as excessively narrow. Moreover, the narrowness derives from more than the fact that practice per se has been the focus of the search for a linkage with the world of scholarship; it also has to do with the almost total absorption with the goal of improving practice and discovering better techniques. We seldom ask whether educators might now be doing as well as can be done in many aspects of their endeavor. We might pay more attention to the possibility that educators may deserve and benefit greatly from some external confirmation of the appropriateness of much that they are now doing.

For example, there are hundreds of children who are obviously bright but are not very good students. Sensitive teachers give these children emotional support and encouragement, raising the children's self-esteem. Basic research suggests that many of these teachers are doing as well as anyone could, given what we know and what we do not yet know. We do know that skills mature at different rates: some children will be quick to learn addition and slow to ride a bike; others will be slow to learn to add but quick to learn to ride. We know that all of these children need confidence in themselves and support from adults who expect they will eventually succeed. We do not know why these children differ, and trying to "prevent" the differences by tampering with curricula, desks, noise levels, and so forth is simply premature. Using what we already know about children and their development and building on that knowledge is more sensible.

So long as we remain fixed on the goal of improvement, we tend to overlook the many kinds of support for the efforts of educators that knowledge from the social sciences or elsewhere might provide. We tend to forget that a firmer rationale for current practices might prove a greater boon to the vitality of educational efforts than would an entire compilation of suggestions about how to improve this or that pedagogical technique.

Finally, the educational practitioner, by definition, is not simply a person who knows how to do something—teach a class, run a school, plan a curriculum, design a test, or what have you—but is also a willing actor who practices with some degree of enthusiasm. The willingness of practitioners to continue their work, which we are calling a "commitment to act," can be strengthened or weakened by a vast number of considerations, ranging from such mundane matters as salary and working conditions to those principles that can add a sense of vocation, a calling, to work. That sense of calling makes the practitioner, not simply a person performing a task, but also a person of principle.

It is difficult to speak of the commitment to act without leaving the impression that all educational action is inspired by noble thoughts. Such an idealized image is of course false. Yet we also know, or at least suspect, that if all such thoughts were absent, if the practice of education were motivated by nothing more than the need to make a living, the enterprise itself would falter. It is imperative, therefore, to understand how to sustain this sense of mission in practitioners.

Is it not possible that fundamental research may in some fashion contribute to practitioners' commitment to act? Certainly we can imagine educators thinking about what they read and how it relates to their work. Such an attitude of seriousness in reaching out for deepened understanding is itself an expression of the practitioner's commitment to act. A person's seriousness feeds upon the seriousness of others, and sound scholarship provides a rich resource.

Thus, one way of describing the manifold connections between fundamental research and the practice of education is to establish the potential of such research to alter practitioners' views of reality, to change their conceptions of what is educationally possible, to offer them better ways of working as well as an improved rationale for their actions, and to deepen their commitment to their work. Though admittedly incomplete, this conception of how research might have an impact on education is offered as a substitute for the conventional stereotype of omniscient scientists telling teachers how to teach.

How do we know that fundamental research does indeed influence educators in the ways we suggested it may? The usual reply to such a query, even when limited to the traditional link between research and practice, is to select dramatic examples that will overcome the critic's doubts. Typically, a search turns up the names of past greats, such as Freud, Dewey, and Thorndike, or outstanding contemporaries, such as Skinner, Piaget, and Mead, whose ideas have obviously left their mark on both thought and practice in education. The work of these people is surely concrete evidence that fundamental research makes an important difference in educational affairs. Educators, parents, government officials, and other people throughout the world see reality differently as a result of what these few people have written and said. Educational goals and practices have clearly been modified as a result of their seminal ideas. It is even possible to gather testimony that would show that the educator's commitment to act has in many instances been strengthened by the insights of these scholars.

Offering such examples as evidence of the importance of research, however, neglects the vast bulk of scholarship (and, therefore, the great majority of scholars) in favor of a few of its stars. So constrained, we limit the search for effects that, as it were, have surnames attached to them. In doing so, we ignore many ideas that have profoundly affected educational practice; because they have come from so many different sources and have been reinforced by the writing of so many different scholars, they have become, in effect, anonymous.

Consider, for example, research on reading. The sources of significant contributions to this research include major universities and research institutes on three continents—North America, Asia, and Europe. This international community of scholars has begun to understand why learning to speak is so easy but learning to read, for many, is so difficult. They have learned, for instance, that being able to hear, segment, and repeat phrases, words, and phonemes found in the flow of speech is one important precondition for learning to read; and that "segmentation" can be taught to those to whom the skill comes slowly. This work cannot be summarized by pointing to one or two great people but must be characterized as a cumulative flow of ideas from many sources that have outlined what can be done to improve a child's readiness to read.

If we focus in particular on an individual's contribution to education, it is easy to neglect the work of many people to bring that contribution into practice over the years. For instance, we are indebted to Jean Piaget for the concept of sensorimotor intelligence in infants; his work forty years ago changed the view of infant behavior from one of helpless, reflexive activity to one of intense interaction with the environment, undergoing systematic changes. Piaget's descriptions of infant development stimulated an enormous amount of research (particularly during the 1960s) on infant behavior: how well they can discriminate a wide variety of stimuli, learn complex associations, and, in a sense, control their social environment by eliciting stimulation from parents. Myths about what babies could not do collapsed as scientists, with new or improved techniques, demonstrated what they could do. This research had tremendous implications for the appreciation of both nature and nurture in the development of the human infant, for knowledge about individual differences, and for the capacity to help children who do not develop normally or who are "at risk." The realization of the infant's rich behavioral repertoire has led today to a whole new field of endeavor, aimed at identifying the infant-environment combinations that will elicit, maintain, and maximize developmental potential.[2]

The influence of fundamental research, therefore, is far more significant than a set of biographical examples indicates. Scholarship in general enters the minds and colors the actions of educators through a series of filters that are as yet poorly understood. What is needed is some way of describing this filtering process.

A beginning approach to that wider view, but one that still keeps us too closely attached to the contributions of individuals, is to examine the bibliographic sources used by educational writers. For example, a review of the references cited in Charles Silberman's *Crisis in the Classroom* (1971), surely one of the most widely read educational books of this decade, reveals not simply the names of the six scholars we have mentioned, but literally dozens of others, including economists, anthropologists, sociologists, historians, philosophers, literary and social critics, jurists, and even a political leader or two.

Or consider another influential book of the late 1960s, Rosenthal and Jacobson's *Pygmalion in the Classroom*. Among approximately 230 references, one finds not only the psychologists, who might be expected to be referenced in a work that is largely psychological in character, but also scores of others from related disciplines. In a volume as exclusively educational as a recent Yearbook of the National Society for the Study of Education, entitled *The Curriculum: Retrospect and Prospect*, the index is dominated by reference to educational writers, as one might expect, yet we also find there some interesting surprises: names like Niels Bohr, Kenneth Boulding, Sir Kenneth Clark, Edward Hall, David Hume, and C. Wright Mills.

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[2] For more detailed analyses of the research described in the previous paragraphs, see Gibson and Levin (1975) on reading and Horowitz and Dunn (1976) on infant development. In the United States, most of this work has been supported by the National Institutes of Health, the National Science Foundation, and the National Institute of Mental Health. The Office of Education has sponsored research on reading, as has, more recently, the National Institute of Education.

An examination of references in the periodicals of education shows a similar diversity of sources. Our own limited review, described in Appendix A, indicates that the journals of education draw heavily on fundamental research. The educational magazines, written for the practitioner, also cite basic research. In fact, among the top twenty periodicals referenced in educational periodicals, approximately half are basic research journals representing an array of disciplines: psychology, sociology, economics, statistics, linguistics, political science, and anthropology.

Now it is a large step and a dangerous one to move from even a brief examination of bibliographic citations to the conclusion that the works cited have had a real influence in the field of education. The majority of such attempts to trace the impact of research fail to prove whether (or to what good) research influences practice and indicate only where research may have had impact.[3] For example, one finds in the writings of educators throughout the twentieth century references to fundamental research used to bolster the movement to gear texts and curricula to student abilities. The beginnings of that movement, however, antedated the scientific research, and it was surely given impetus by such social phenomena as the increasing sophistication of teachers, whose average years of schooling advanced from twelve in 1900 to about seventeen in 1970. Nonetheless, large bodies of research show remarkably close ties with changes in practice. These changes—the assignment of different textbooks to pupils at different grade levels, the placement of children within classes in different reading groups, and the abandonment of useless, boring, and difficult tasks, on which a large proportion of students invariably failed—all required a new way of thinking about children. Fundamental inquiry has supported, even provoked, these intellectual revolutions.

THE FILTERING OF IDEAS FROM FUNDAMENTAL RESEARCH

CITATIONS FROM "DR. SPOCK"—1946

"244. ***Craving for sweets is often caused by parents*** . . . *Dr. Clara Davis in her experiments in letting children choose their own diets from a variety of natural foods found that in the long run they only wanted a reasonable amount of the sweeter foods* (Spock, 1946, pp. 242)."
Spock is referring to Davis, C. M., Self-selection of diet by newly weaned infants. *American Journal of Diseases in Children*, 1928, 36, 651-679.

"289. ***Balkiness between two and three*** . . . *The 1-year-old contradicts his mother. The 2 1/2 year-old even contradicts himself. (Gesell and Ilg bring this out clearly in* ***Infant and Child in the Culture of Today*** . . . (Spock, 1946, pp. 285)."
Reference is to Gesell, A. & Ilg, F. L. (1943) New York: Harper and Brothers.

"336. ***Democracy builds discipline*** . . . *Actual experiments have shown that children with a teacher who tells them what to do at every step of the way will do a good job while she is in the room. But when she goes out, a lot of them stop working. . . . These experiments showed that children who have helped choose and plan their own work, and have co-operated with each other in carrying it out, will accomplish almost as much when the teacher is out of the room as in. . . .* (Spock, 1946, pp. 330)."
Spock is referring to research conducted in Kurt Lewin's laboratory. (See Lippitt, R. (1940) An experimental study of the effect of democratic and authoritarian group atmospheres. *Univ. of Iowa Studies of Child Welfare 16*:43-195; Lippitt, R. and White, R. (1943) The "social climate" of children's groups. In R. G. Barker, J. Kounin, and H. Wright, Eds., *Child Behavior and Development*. New York: McGraw Hill, pp. 485-508.)

CITATIONS FROM "DR. SPOCK"—1968

"91. ***What regularity and flexibility are all about*** . . . *During the first half of this century in this country, babies were usually kept on very strict, regular schedules. . . . It took many more years before doctors dared to begin experimenting with flexible schedules. . . . The first experiments were carried out by Dr. Preston McLendon and Mrs. Frances P. Simsarian, a psychologist and a new mother, with Mrs. Simsarian's new baby. . . . They called this an experiment in "self-demand" feeding. This term has become well known. . . . Since that experiment led the way, in 1942, there has been a general relaxation in infant feeding schedules, which has had a wholesome effect on babies and parents* (Spock, 1968, pp. 60-61)."

"462. ***The control of aggression*** . . . *nowadays I'd give a mother much more encouragement in her inclination to guide her son away from violence. A number of occurrences have convinced me of the importance of this. . . . Watching violence can lower a child's standard of behavior. Recent psychological experiments have shown that watching brutality stimulates at least slight cruelty in adults, too* (Spock, 1968, pp. 313-314)."
The experiments to which Spock refers are described in Berkowitz, L. (1962) *Aggression*. New York: McGraw Hill.

"585. ***Identity.*** *A central problem for the adolescent and the young adult is to find out what kind of person he is going to be, doing what work, living by what principles. It's partly a conscious but even more an unconscious process. Erik Erikson has called this the identity crisis and exemplified it in his biography of Martin Luther* (Spock, 1968, pp. 421)."
See Erikson, E. (1958) *Young Man Luther*. New York: Norton.

ADVICE FROM "DR. SPOCK"—1946

"341. ***The extra bright child*** . . . *This brings up the question of teaching a bright child to read and figure at home before he starts first grade. It often does harm, and it never helps. It will only put him out of step with the other children, and may make it more difficult for him to catch onto the school's system of teaching these subjects . . .* (Spock, 1946, p. 334)."

AND IN 1968

"570. ***The extra bright child*** . . . *That brings up the question of teaching a bright child to read and figure at home before he starts first grade. A parent may say that the child is asking questions. . . . This is true to a degree with some children, and there is no harm in casually answering their questions* (Spock, 1968, p. 406)."

The research which had most effect on changing conceptions of gifted children was probably the early work of Leta Hollingworth and Lewis Terman. (First publications: Hollingworth, L. S. (1926) *Gifted Children, Their Nature and Nurture*. New York: World Book Co.; Terman, L. M. et al. (1926) *Mental and Physical Traits of a Thousand Gifted Children*. Stanford, Calif.: Stanford U. Press.) In addition, sociologists such as Robert Havighurst (Conditions Productive of Superior Children. *Teachers College Record*, 1961, 62:524-531), in mapping out the relationships between social class and achievement, stimulated ideas about how parental behavior in the home influenced children's achievement. The work of psychologists such as David McClelland and his colleages (e.g., McClelland, D. C., Atkinson, J., Clark, R. and Lowell, E. (1953) *The Achievement Motive*. New York: Appleton-Century-Crofts) indicated also the importance of early training in the home. Finally, animal and human research on curiosity (e.g., Harlow H. F. (1953) Mice, monkeys, men and motives. *Psychological Review* 60:23-32) and on stimulation (e.g., Levine, S. (1960) Stimulation in infancy. *Scientific American* 202:80-86) were influential in provoking and reinforcing ideas about the importance of stimulation and challenge in children's development.

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[3] For a major review and discussion, see Clifford (1973).

IN 1946
"*343. **Poor reading because of left-right confusion** . . . a certain number of children particularly boys . . . begin to be confused between 'dog' and 'god' . . . . This difficulty occurs more commonly in the child who is neither strongly right- or left-handed, or who has been changed from left to right by training* . . . (Spock, 1946, p. 406).

AND IN 1968
"*572. **Poor reading because of slow development of memory.** To you and me the word 'dog' looks entirely different from the word 'god' . . . But there are about 10% of children—most of them boys—who have more than average difficulty recognizing and remembering the appearance of words. . . . They need to be reassured by parents and teachers that this is a special memory problem . . . that they will learn to read and write and spell as soon as they are able* (Spock, 1968, pp. 408-409)."

The notion that reading and other academic difficulties are primarily a matter of "normal" developmental lags (and spurts) was influenced heavily by research indicating the low correlation between tested IQs of very young children and of 18-year-olds—that is, the findings that intervention may not be necessary to counteract slowness in an academic skill (e.g., Hunt, J. McV. (1964) How children develop intellectually. *Children* 11:83-91). Another influence from research on ideas about reading was due to the shift in attention from the role of response-learning to that of perception and sensation in intellectual development. (See, for example, Dennis, W., and Dennis, M. G. (1940) The effect of crawling practice upon the onset of walking on Hopi children. *Journal of Genetic Psychology* 56.) Studies of cultural deprivation and of self-esteem influenced the growing conviction that a child's self-confidence is crucial for academic success (e.g., Lewis, O. (1961) *The Children of Sanchez*. New York: Random House).

We might ask at this point, if so many already contribute to educational inquiry, why make a special effort to encourage others? Furthermore, if the dynamics of influence are actually opaque and mysterious, does not supporting fundamental research in the hope of a salutary effect on educational practice or practitioners become a very risky business indeed? Finally, if educators truly feed on such intellectual resources, how is it that in their actions they falter so? If so much knowledge is available, why do we continue to hear of falling test scores, vandalism in classrooms, poor readers, and college graduates who can barely write grammatical sentences? These are tough questions. They require much fuller answers than can be given here, but we can point toward the directions in which those answers may lie.

The openness of the model of influence being proposed here, together with the vagueness of its operation, is troublesome. It allows ideas from almost anywhere to insinuate their way into the consciousness of educators and there to influence how they look at the world and act upon it. Such a model suggests that educators already have more than enough ideas.

Of course, there is always a shortage of good ideas, and always room for new knowledge. But this statement alone is unsatisfying, for it does not tell us what "good" means within the present context and does not contain any hint of what new knowledge should be pursued within the many intellectual domains open to exploration. Ideas that are good in the sense of the word used here are those buttressed by rational and empirical arguments, which are the kinds of arguments offered by scientific research and disciplined scholarship. Some knowledge, on the face of it, is closely related to the substantive concerns of educators, some more distantly so. Within broad limits, it is the former to which we would give preference in seeking support for new endeavors.

These considerations lie behind the contention that serious thinkers in the social and behavioral sciences and the humanities such as philosophy or history are likely to affect the collective consciousness of educators. Their task is to understand better how, where, and why people learn and mature. The history of science suggests that we should hesitate to predict the impact of new knowledge, but research on the brain will surely turn up insights that find their way by some circuitous route into the thinking patterns of educators, and research into the origins and maintenance of social class structure is likely to do so. The pursuit of both efforts entails some risk, to be sure. There is obviously no guarantee that any research, fundamental or applied, will have beneficial consequences for educational practitioners. This does not mean, however, that it is absolutely impossible to predict which are likely to yield such results or to judge which have yielded results. In the end, we can judge by the evidence of use—whether the old idea, like the kerosene lamp, is discarded because the new idea, like the electric light, is more useful, sensible, and efficient.

The problems that continue to plague educational efforts, and schools in particular, are indeed an embarrassment, especially so in the light of all that has been written and said to aid the process of education. Why have we not yet learned how to eliminate reading problems? Why is learning how to write correct English still such a mystery for so many?

There is an easy answer to such questions, but it is not very satisfying: human beings are complex creatures, far more complex than the most complicated machine that they themselves have ever built. Small wonder, therefore, that we have only begun to probe the mysteries that contain the answers to educational strivings. Such a reply is undeniable but very frustrating, for it implies that we shall be saddled with the same problems for a long time to come. Yet is is also possible, if we look back, to gain some solace from the genuine progress that has been made.

The glacial advance of human understanding is a topic about which volumes have been written. More are clearly needed, for as yet we perceive the signs of social growth only dimly. Indeed, there are some who would claim that we commonly misperceive those signs, mistaking novelty for improvement, retrogression for advance. In education, it is especially easy, given the vexing problems that remain, to lose sight of the slow advance, easier still to mistake change of any kind for progress. Yet it is important that we remind ourselves from time to time of how far we have come.

We see first, even without a statistical gauge, that more people are attending school today than ever before in the history of mankind. Moreover, the fullness of that experience for the average person, the portion of his or her life and the amount of time and energy invested in the process, is also greater than ever before. We can also see that the quality of education as a human experience has undergone marked improvement over the years, not only between some distant historical point and now, but also within the lifetime of most adults. The curriculum of schools and colleges, for instance, has never been more varied in scope and variety. High school students are learning now what was once thought to be college-level material, and elementary students are acquiring skills that used to be taught in high school. While some might argue that it has become too ambitious and that we should not be trying to teach so much to so many, there is no doubt that the varied fare that schools offer today is an advance over the three Rs of our grandparents' day.

Consider also the instructional materials used in the service of today's enriched curriculum—textbooks, workbooks, films, tape cassettes, TV programs—all designed to enhance the attractiveness and efficiency of the learning experience. Again, it is possible to dismiss some of these new resources as mere gadgetry, but even the most nostalgic critic would have to admit that we have come a long way from the days when lessons were taught by word of mouth and recitation books.

And what of the classroom? Gone forever, we would hope, are the hickory stick and the dunce's cap. Fast disappearing, too, are other forms of discipline that thousands of pupils have suffered in the past—rapped knuckles, standing in corners, sentences copied as punishment, and demerits for whispering in class. Also gone or going is excessive reliance on rote memorization, the parroting of answers to questions that were only partially understood, and the soporific boredom of the recitation method. The treatment of pupils has clearly become more humane over the years.

The gradual elimination of cruelty from classrooms is only one of several advances in pedagogical practice. There is also an increased tendency to treat each learner with greater dignity, to perceive each student as an individual, to shape an educational program in response to that perception, and to afford each person a wider range of choices and encourage active participation in the learning process.

Certainly, the progressives, Dewey among them, had a hand in this development, but a fuller historical understanding reveals deeper roots to all of these ideas. Dewey's notions and those of his followers took hold, not because he had stumbled upon something new, but because he articulated what the human mind in a large part of the world was in the act of discovering—an evolving appreciation of human potential and its release through the application of reason under conditions of increased freedom. That discovery has taken a long time—and we are still at it. Systematic, disciplined inquiry, which is but another way of saying fundamental research, can help to push it along.

From *Fundamental Research and the Process of Education*

Chapter 3: Fundamental Research Topics Relevant to Education

"Any basic science has an inner logic of its own, which for considerable periods of time, guides inquiry, defines problems, and discloses opportunities. This inner logic does not imply irrelevance to the practical world; it may however, imply patience in allowing the science to unravel its internal puzzles without demanding that relevance always be instant or direct."

That statement (National Research Council 1969) about the connection between research and the practical world was written eight years ago by another committee not unlike this one. It bears repeating, because sometimes fundamental inquiry and human affairs seem to be at odds—one preoccupied with dull facts and abstruse theories, the other caught up with today's crises.

This divergence is more apparent than real. True, it is dangerous to make open-ended promises that a line of fundamental research will solve one of those worldly crises. Too many ideas that look good in the beginning must be discarded in light of new evidence, and too many problems are more complex, or even of a different nature, than originally thought. In education, the character and priority of problems, and the goals their solutions assume, often undergo lengthy public debate. Yet it is, after all, the real world that scientists and scholars seek to understand. Recent work suggests that in the long run their curiosity has yielded important applications, even when the object of their inquiry had no resemblance to its eventual utility (Comroe and Dripps 1976).

This chapter is an attempt to illustrate the character of fundamental research that in our opinion is or will be relevant to the conduct of education. We have chosen examples of fundamental research that, in our judgment, are of good quality and speak to the needs of education. We have not sought to represent all fields, nor have we searched for the most important issues facing the educational community. Rather, we have tried to indicate issues facing the educational community. Rather, we have tried to indicate where research might reveal general principles and broad understanding of basic educational processes, which hold the promise of relevance.

We begin each of the eight examples by posing an educational goal that many people consider desirable. We then list some of the public issues that describe or reflect the apparent problems in moving more effectively toward the goal. Finally, we describe some fundamental research that we believe may provide a better understanding of the problems and a means of approaching these goals.

Each of the examples except the first describes contemporary fundamental research. (When research is not available, we have made some guesses as to what it would be like.) We have reserved the first example, however, for a brief discussion of research and scholarship from the past to illustrate the historical complexity, breadth, and erratic advance of fundamental inquiry.

Example 1: Understanding Cognitive Development

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Educational Goal

An end product of education should be people who think for themselves and can learn on their own. They should be able, for example, to critically evaluate information presented to them and to seek out new information when their own is incomplete.

Public Issues

For at least a century, many people have believed that in moving toward this goal, educators should encourage and stimulate the natural human interest in learning and should build on the natural development of the human ability to learn, to think, and to create. Some people have always emerged from schooling with enthusiasm for learning and the ability to judge, to think critically, and to be creative. Nevertheless, satisfaction with these successes has been tempered by dissatisfaction with educational practices that fail to capitalize on or adapt to actual human characteristics, especially as they develop. In 1867, the author of a book for teachers (quoted in Schwebel and Raph 1973, p. 3) argued:

"For many years there has been a growing conviction in the minds of the thinking men of this country that our methods of primary instruction are very defective because they are not properly adapted either to the mental, oral or physical conditions of childhood. But little reference has hitherto been had to any natural order or development of the faculties or to the many peculiar characteristics of children."

Research Issues from the Past to the Present

If one looks back, it is clear that research and scholarship have been successful in delineating a "natural order of development of the faculties." Studies of child development, such as the remarkable body of research and theory stimulated by Jean Piaget, have considerably advanced understanding of the special ways that young children understand their experiences, the sources of error and misunderstanding that crop up in their thinking, and the stages and sequences in the growth of the mind. This work has had a pronounced effect on the conduct of education, especially in the elementary school. Its volume precludes a full description here, but we can typify the kinds of communication that have existed—and still exist—between the worlds of fundamental research and education.

- *Teachers are being taught broad principles of cognitive development.* In general, current textbooks of child development and educational psychology used in teacher training now present an abbreviated version of what is known about natural cognitive development. Piaget's writings are voluminous and subtle, and publications of empirical research are highly technical. However, summaries of cognitive development theory for teachers (see Furth 1970, Helmore 1970, Wadsworth 1971, Schwebel and Raph 1973) exist as well as books that draw more broadly from developmental psychology, by such theorists as Vygotsky and Bruner (see Landsdown et al. 1971).
- *New school curricula are being designed using the findings of developmental psychology.* Over the last ten years, a variety of curricula have been based on notions of cognitive process, concept, and inquiry drawn from developmental psychology. The name of Piaget has become an accepted word in educational parlance, and the frequent invocations of his name may often be as superficial and as empty as the appeal to John Dewey's name once came to be. Nevertheless, a number of new school curricula do appear to rest on a deep and considered use of the fundamental work. These range from curricula from preschools to upper-level curricula in science and mathematics (see Lavatelli 1970, Brearly 1970, Sonquist et al. 1970, National Council of Teachers of Mathematics 1971, Karplus 1964).
- *Tests and diagnostic systems are being developed to explore how children think and see their world.* At the heart of the new approaches to cognitive development is the assumption that children do not learn primarily by acquiring facts, skills, or behaviors (White and Siegel 1976). Children's thoughts pass through successive states or stages according to an orderly but complex process of maturation. This view of learning dictates a radically different approach to the assessment of children's abilities or achievements. Traditional assessment techniques are designed to sample attained skills or abilities; some researchers have tried to create newer assessment techniques intended to analyze the components and organization of a child's thinking (see Fogelman 1972, Tuddenham 1970, Pinard and Laurendeau 1964).

Roots of Contemporary Thinking. The fundamental research that has led to the modern understanding of cognitive development has historical roots of considerable complexity. Present-day scientific arguments about patterns of cognitive development rise from a research tradition existing for nearly 100 years and, if one looks at anticipations in philosophical thinking, still longer. Although modern theories address psychological questions, their form depends on earlier work in biology, philosophy, comparative linguistics, psychiatry, and mathematics as well as psychology. These heterogeneous sources are as necessary to the full articulation of the theories today as they were in the past. The history of fundamental inquiry into cognitive development is far too large a topic for this forum; we can, however, provide an outline that suggests the depth and breadth of its intellectual ancestry.

One of the most conspicuous and well-known arguments of contemporary cognitive development theories is that children's thinking shows progressive reorganizations with age, so that thought has identifiable "stages." Piaget has argued that from birth to two years of age, infants show an early kind of understanding of the world that he calls "sensorimotor intelligence"; from two to seven years of age, they show predominantly "figurative thought"; from seven to eleven, they show an early form of symbolic reasoning called "concrete operational thought"; from eleven onward a more abstract reasoning called "formal operational thought." Stages that are roughly congruent have been proposed by such major theorists as Heinz Werner, L. S. Vygotsky, and Jerome Bruner.

These stage postulations rest in part on the findings of research with children, studies of their patterns of adaptation, their responses to questions, and their ability to solve problems. They rest also on evolutionary analyses of the brain and mind and philosophical analyses of epistemology. In fact, early theories of stages in the growth of thought arose well before there was any organized scientific movement directed toward the study of children's behavior and thinking. They appear to have relied on casual observations of children supplemented by a wide body of information on the organization of the mind and the nervous system.

One of the first extended accounts of stages in children's thinking is found in George John Romanes's *Mental Evolution in Man*, published in 1889. Romanes was an evolutionist, and in this book and others he was seeking to connect human mental life to the kinds of mental life found in the animal kingdom. At the same time that he was concerned about establishing congruences between people and animals, he attempted to establish specific differences between people and animals. He argued that very young children share with animals a primitive kind of mental life that he called "receptual ideation," which is a kind of wisdom of action and is thus not unlike Piaget's "sensorimotor intelligence" or Bruner's "enactive representation." Romanes proposed that, in humans, cognitive development occurs as children become progressively able to symbolize or represent to themselves their own knowledge. Thus, in children, receptual ideation serves as a platform upon which is first erected "preconceptual ideation." Romane's theory of the cognitive development of children did not receive much attention at the time it was offered. He placed heavy reliance upon casual and anecdotal accounts of the behavior of animals and children, casual cross-cultural material, and inferences from comparative philology. Yet his work stimulated a demand for more systematic and scientific data. In retrospect, these speculative postulations deserve some respect. He had sketched out a developmental, stagelike progression of human mental life that in form and substance was a clear anticipation of present-day theories.

In the 1890s, Ivan Sechenov of Russia published a parallel theory of mental development in children that he called "The Elements of Thought." Sechenov was a physiologist and a historically important proponent of a reflexological view of brain function—the notion that the human brain, and thus human thought, are determined by a nested, hierarchical system of reflexes. He sought in this brief volume to synthesize the findings of his physiological analysis with Herbert Spencer's evolutionary philosophy. He elaborated an argument of stages in children's thinking and knowledge that held that they first form "automatic sensory thinking," then "concrete object thinking," and finally "abstract thinking." There is in this volume not even the casual and anecdotal appeal to empirical data about children offered by Romanes. Nevertheless, Sechenov's speculative argument anticipates in important respects contemporary theories of stages in cognitive development.

These early theoretical fragments are noteworthy because they illustrate an important characteristic of contemporary analyses of children's cognitive development. Such analyses depend to an important extent on exploration of brain function and social and cross-cultural differences in thinking as well as on linguistic and philosophical analyses. If the significant factual details and propositions of such theories depend on systematic and careful study of children, their bases are a very broad range of inquiry.

Through the twentieth century, an important, growing science of psychology served to enlarge and articulate the brief theoretical sketches of the late nineteenth century. In addition to Romanes and Sechenov, James Mark Baldwin and Sigmund Freud put forth early speculative accounts of the stages of children's thought. Baldwin ultimately embodied his analysis in an extended philosophical analysis of human epistemology (Baldwin 1906-1915). Freud put forth his stages as part of his psychiatric theory of the origins of human mental disturbances. Both were evolutionary stage theories of mind, and both had direct influence upon Piaget (who in his early years undertook systematic training in biology, psychology, philosophy, and psychoanalysis).

The influence of theoretical writings about cognitive development burst onto education in the late 1950s and early 1960s. Their impact was so sudden and so large that some have tended to view the research developments as a breakthrough, the product of the genius of Piaget plus the brilliance of a few other exceptional people. With all due credit to the irreplaceable role of those exceptional individuals, their work may reasonably be regarded as a harvesting. As we have seen, the evolutionary, staged, developmental view of the mind was established by 1900. What happened in the decades from then until now? An enormous amount of "normal science" and theory was compiled in the contributory scientific disciplines:

- Voluminous studies were undertaken to explore all aspects of children's development. Data were compiled on physical growth, perceptual development, learning, problem solving, language development, individual differences, influences of social class and culture, peer interaction, physical pathology, psychopathology, etc. (see Mussen 1970, Woman 1972).
- From biology came extensive analyses of evolutionary mechanisms, including fundamental reconsiderations of evolutionary theory (see Mayr 1963, Waddington 1957).
- The casual and anecdotal accounts of animal behavior of the late 1890s were supplanted by large literatures composed of careful, detailed studies of animals in the laboratory and their natural habitats. The research and theory characteristic of modern learning theory, ethology, and sociobiology were elaborated (see Hilgard and Bower 1975, Wilson 1975).
- Explorations of the brain and nervous system provided a growing picture of the information-processing and cybernetic mechanisms characteristic of the human's registration of experience. Perception, memory, attention, learning, and emotion came to be more and more clearly understood in neuro-scientific terms (see Rosenzweig and Bennett 1976, Quarton et al. 1967, Ashby 1960, Arbib 1972).
- Cross-cultural studies provided a broad picture of children's socialization as well as a heightened understanding of the differences that occur when children are

reared in societies with and without schools. Sociological studies provided both data and theoretical frameworks with which to understand socialization of children through families and schools (see LeVine 1970, Whiting and Whiting 1975, Cole and Scribner 1974, Goslin and Glass 1968, Richards 1974).

Current Issues. The major difference between the developmental theories of the late 1890s and those of the present is that the latter are based on the growth of supportive knowledge bases. Today there are more data than ever before about children and the problems raised when one attempts to understand how all human beings learn. A glance at the writings of contemporary developmental psychologists will show how broadly they make use of outlying knowledge bases—not only the work indicated above, but also work in history, mathematics, philosophy, and the humanities. With the diffusion of knowledge across disciplines and the careful study of children, it has become possible to offer the complex theories of child development that now form a basis for educational use.

The theory of cognitive development now used in education is for the most part a rather early formulation of Piaget's system; his theory has been "frozen" for better public discussion just as, today, most public discussions of Freudian theory appeal to the earliest statement of his system and do not take into account the considerable revisions and reconsiderations of psychoanalytic theory that have taken place. During the more than fifty years over which Piaget has set forth his work, there have been distinct changes in the theory that bears his name. In reviewing his own work, Piaget (1970) made it clear that he counts himself as foremost among the revisionists of Piaget. Certainly, his new writings and his associates have made it clear that there is much more to be considered.

The erratic, small movements of fundamental research have already shown that there is something awry in the early picture of fixed cognitive development. It is not clear that the stage boundaries are as definite as Piaget once said they were. The child's cognitive development is not as structurally unified as the classical theory indicated it should be. Children show large leads and lags in different aspects of their cognitive performance. They show sensitivities to situational factors that may move them "up" or "down" in their stages of thinking.

One can rather confidently predict that the current patterns of movement in fundamental research bearing upon children's learning and knowing will sooner or later produce new harvestings, better pictures of the "natural order of development of the faculties." Just as Piaget (1970) regards his work as a restatement for education of what John Dewey once said, one can expect people to offer new ideas that reshape what Piaget has said. To some degree, this has happened already. A clearer, more articulated, more accurate picture is emerging of the developmental pattern of children's thought first glimpsed in the late 1800s.

Example 2: Education Outside Schools

Educational Goals

Although public subsidy for education is overwhelmingly centered on schools, there is a public interest in and public support for education and training outside school walls. Two particular concerns are: (1) that adults have opportunities to upgrade their technical skills or acquire new ones and have opportunities for broader, more humanistic kinds of educational experiences, and (2) that people of all ages but particularly children have access through the media to accurate and stimulating information about their world.

Public Issues

In 1900, only 18 percent of all American workers were employed in white collar (i.e., non-manual) jobs; today, 47 percent of all jobs are white-collar, and it is predicted that by 1980 this proportion will exceed 50 percent. Extrapolating from several lines of similar evidence, some have argued that America is undergoing a major social and economic transition from an industrial society organized around the production of material goods to a post-industrial society organized around the development of knowledge and the provision of services (Bell 1973). Others have urged that public education be responsive to such trends by "educating the child for a world of change" and providing more extensive opportunities for training in later life.

Education through the media, especially television, is also a public issue. Many people view the freedom of the media as a mixed blessing. Some have argued that the media amplify public disturbances by giving unbalanced attention to them. Others have argued that the media teach children aggression, violence, or antisocial behavior by offering attractive models of such behavior to children.

Research Issues

Research has broadly defined norms and variations in the development of children and the effects of schooling. There have been studies of school processes, attitudes towards education, and relationships between schooling and other institutions of society. These studies provide some basis for planning and judgment about the education of youth. However, with heightened interest in education in adult life, there has been a growing awareness that we have no similar basis for understanding human intellectual development in the adult years. While a few studies of intellectual and personality development in adulthood have been the basis for much speculation in the planning of practical programs, the question of development after adolescence is largely an open question for future research. Sustained inquiry is needed concerning lifelong educability and the character of high-order abilities for tasks such as systematic problem-solving and extended conceptual discourse that may develop after childhood.[4] An important contribution of fundamental research to these concerns is the testing of hypotheses about adult learning and motivation and the probing of their theoretical and practical implications.

How can we discover the potential of education outside schools? In this society, schools have such pervasive influence on the education of children that it is hard to "control" for their effects and examine what other aspects of American life—family, work, experience with the media or the community—contribute to an individual's education. Some useful information can be gained if we examine the skills and the thinking of children and adults in societies without schools or with educational systems conspicuously unlike our own. For example, cross-cultural research on cognitive development has developed some useful comparative data (see for example Peluffo 1962, Goodnow 1962, Piaget 1966, Bruner 1966, Scribner and Cole 1973, Cole et al. 1971, Luria 1976) and has led, most recently, to interesting efforts to single out the specific effects of schools as opposed to other settings on the cognitive functioning of individuals.

Sociological studies (Inkeles and Smith 1974) on the degree of "individual modernity," for example, indicate that schooling is a central factor in shaping individual attitudes and values. That same research, however, has shown that post-adolescent socialization experiences—at work, in contact with the mass media, through social experiences in the city—explain important parts of an individual's outlook. This suggests, first, that much of an individual's development is sustained by forces outside the school, and second, that great potential for personal growth exists after individuals have completed formal schooling. Moreover, the data indicate that for the most disadvantaged segments of society, a year in a factory may teach a person as much arithmetic, vocabulary, and geography as a year in school.

One of the most interesting areas of research on education outside schools is concerned with television. Public controversy over the influence of television on children's behavior has generated a considerable body of fundamental research. In this regard, the role of social science research both prior to and during the preparation of the Surgeon General's report on the impact of television violence provides one example of the contribution that fundamental research can make to public discussion of contemporary social problems.

During the 1960s, laboratory studies tested two competing theories concerning the effect on children of TV portrayals of violence. One theory predicted that the provision of role models was of great importance in social learning, and hence, televised examples of violence would stimulate imitative acts of aggression; the other theory maintained that the vicarious experience of violence would have a cathartic effect upon children's aggressive tendencies. Laboratory studies supported predictions derived from the former theory; they found that the incidence of violent acts increased, often dramatically, following a child's exposure to portrayals of violence (see for example Bandura et al. 1961). As with many controversial laboratory findings, questions were raised about the applicability of these results to the behavior of children in natural (i.e., non-laboratory) environments. Subsequent field studies, however, have found similar results (see for example McIntire and Teeran 1972, Dominick and Greenberg 1972); the most persuasive of these studies (Eron et al. 1972) found that there were significant correlations between exposure to television violence in childhood (age nine) and aggressiveness in late adolescence (age nineteen).

Research on the educational uses of television raises more questions. Although television viewing occupies more than 10 percent of the waking time of the majority of Americans,[5] the educational consequences and potential of this phenomenon are poorly understood; the knowledge we have is largely descriptive and often anecdotal. We know little about what goes on in viewers' minds as they process what they see and hear on television, or how television can help individuals understand their own thoughts and feelings. We do not know to what extent it can expand a person's knowledge of the world; or how special groups such as the aged, the mentally handicapped, or the emotionally disturbed use it. Indeed, as Lesser has observed (1974), when we know so little about such a pervasive institution, we cannot formulate the most productive and educationally relevant questions. Nevertheless, we do know in a rough sense that television teaches, even if what is learned is of questionable value. Preliminary research (Gerbner and Gross 1974, Dominick 1974) indicates that individuals who are frequent television viewers, particularly of crime shows, overestimate the likelihood of criminal violence against themselves, but also believe that criminals are usually apprehended by the police. Furthermore, correlational and experimental studies (Frueh and McGhee 1975, McGhee 1975, Gross and Fox forthcoming) suggest that heavy doses of American television increase children's acceptance of traditional sex role stereotypes.

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[4] The Committee is especially grateful to G. Woditsch for his comments on this subject.

[5] The General Social Survey (National Opinion Research Center) of 1975 found that a representative sample of American adults spent an average of over two hours a day watching television. More recent surveys put the figure at three hours.

There is some evidence, then, for the significant educational potential of experiences outside school. However, to take advantage of this potential, we need a basic understanding of the process of learning and cognitive development throughout the life cycle. Among other things, we need to know the ways, if any, that learning throughout life differs from learning early in life; how institutions other than schools manage to teach; the qualities that make one organizational environment more effective in learning than another; and the subjects that other settings teach best.

Example 3: Education and Reading

Educational Goal

Individuals should be able to read well enough to inform themselves about public affairs and government decisions, to arrive at reasoned decisions and plans for their lives as parents, consumers, and workers, and to understand written materials such as employment applications, union rules, and insurance policies.

Public Issues

An alarmingly large number of individuals—including some high school graduates—do not have the abilities we think of as comprising literacy, and the results of national testing programs indicate a failure of schools to educate in this regard. Some specific popular questions (see Gibson and Levin 1975) include (1) What is dyslexia, and why do dyslexic children fail to read? (2) Do we need to learn "rapid reading," and, if so, how? (3) How can parents help children with reading? (4) What should we do about educating adults who cannot read?

Research Issues

A major question for research on this topic is an old one, and not yet answered. How do people learn to understand the printed word? Research developments in linguistics, artificial intelligence, and cognitive psychology have recently pointed to reading comprehension as a perceptual and cognitive process (not simply a matter of remembering word associations).

The new cognitive processing approach, in theory and method, is very unlike that taken in the studies of nonsense syllable learning that were common twenty years ago. Researchers employ new mathematical techniques, computer simulations, and research designs. More important, they have demonstrated that in understanding their world, people organize information in useful, hierarchical, rule-guided ways. Even the comprehension of simple stories is guided by a kind of grammar that provides a framework of rules for organizing information so that it may be more easily comprehended and remembered (see for example Bower 1976).

The reason why this organizing process is so important can be illustrated by reference to some work on the role of familiarity in perception (see Krueger 1975). We all know that the experienced eye somehow sees more than the inexperienced. The hunter sees game where others see only trees and grass. The good reader, without seeing any more letters than the poor reader, may excell at inferring the identity of the whole word or phrase. In the past, researchers explained this phenomenon as a kind of perceptual readiness, called "set," whereby the experienced person adjusted perceptual mechanisms to tune in expected material. Later, however, it was discovered that neither set nor some sort of response bias could explain the sizable familiarity effects that were found (Broadbent 1967, Garner 1974). To read, a person must learn so many letter combinations, spelling patterns, and full words that some connection with long-term memory and an organizing structure is required after presentation of the material to be perceived; readiness is not sufficient. Research today, then, is centered on the various organizing structures that might explain how familiarity helps one read. Among the possible hypotheses being studied are that familiarity aids one in extracting visual or verbal features; that it helps in interpreting what is seen; that it is a part of the memory storing process; or that it is part of the "output" process whereby the person reports (to himself or another) what is seen. In the future, this research may help us to understand the kinds of training that are necessary to help poor readers.

Another line of research that holds promise has to do with how people store and represent in memory the information they receive. On the basis of a wide number of studies, many using computer simulations, some researchers now believe that memory processes are the most crucial components of reading comprehension. An example of this research is a set of studies by John Anderson at Yale University. He has had some success in testing a model that predicts that the more information a person has "stored" about a concept represented by a word in a sentence, the more slowly the person will be to verify the truth of the whole sentence. Eventually this research could lead to helping those students whose memory processes may be interfering with their ability to read.[6]

One of the most dramatic developments influenced by the new work on memory and cognitive process has been a rethinking of what we mean by intelligence. For years, of course, it has been known that people who obtain high scores on intelligence tests tend to read and remember well. (The tests were designed to predict academic performance, which requires these skills.) Classically, intelligence has been viewed as a static structural attribute or set of attributes of a person. Recently, however, many quantitative and cognitive psychologists have begun to study intelligence as the manifestation of differences in those cognitive processes that are components of what a person must do to perform intelligently on an IQ test. One researcher (Hunt 1974), for example, has developed a computer model of a cognitive style that solves all of a set of Raven's Progressive Matrices problems, which are used in ability testing.

Many important questions remain to be answered. Theorists disagree, for example, about the way syntactic and semantic knowledge interacts in a reader's cognitive representation of a message. They have no firm understanding of the nature of cognitive deficits that reduce people's ability to understand written text. That much progress has been made in the last ten years, however, is quite clear from the success researchers have had in roughly simulating human thinking. A few years ago, for example, researchers at Carnegie-Mellon University demonstrated that a very simple computer program, using perceptual processes already employed in computer chess programs, moves its attention about the board in a way that resembles the eye movements of a human chess expert. Two simple programs, one concerned with extracting information, and the other with retaining positions in memory, are adequate to account for the known ability of chess masters to reproduce a chess position from memory although they have seen the board for only five or ten seconds (Simon and Barenfeld 1969).

The question of how people learn to understand text is being pursued by investigators from several disciplines, including but not limited to cognitive psychology, computer science, linguistics, and psycholinguistics. Probably, there will be increasing emphasis on fundamental research conducted in school and other educational settings and tests of hypotheses using data collected in these settings. Although there are obvious difficulties, this kind of research sometimes points the way to more valid theory. Carroll's work (1974) on the relation of ability tests to time-in-learning of school subjects, for example, has provided stimulation for the development of new theories about tests of ability at one age and achievement at a later age.

Fundamental research relevant to literacy includes many topics: perception, cognitive processing, mental structure, and the measuring of children's and adults' skills in comprehension and its component parts. Research on skills that are closely related, such as speaking, listening, paying attention, and noticing, is also being pursued. Some of this research has great potential; in fact, it is already widening our conceptions of what skills are basic. There is also linguistic research on language learning and the learning of second languages in school settings. Finally, there is research on artificial intelligence that involves the development of computer models of knowledge structures, the efficient retrieval of information, and adaptable systems capable of learning, understanding, and producing natural language. Work on each of these topics is aimed at increasing the understanding of how the human mind works and how mental skills, such as reading, might be more easily acquired and refined.

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[6] For discussion of work on which this is based see Anderson and Bower 1973.

Example 4: The Brain and Neural Processes

Educational Goals

Fundamental goals of education are learning and increasing the capacity to learn

Public Issues

The brain and the nervous system are the physical substrate of learning and of the allied processes of stimulus detection and observation, information processing and retrieval, coding and language, and motor performance. Although this fact rarely enters public debate, there is considerable public interest in the capacities of the brain, the factors that may reduce its functioning, and the possibilities for treating neurological handicaps.

Research Issues

One aspect of research that shows much promise involves the recording of evoked potentials from the surface of the human scalp. This work is only in its infancy and there are many disagreements and controversies surrounding particular findings at the moment. Nevertheless, there are unquestionably clear and significant relationships between such psychological variables as attention, set, readiness to respond, and cognitive variables and different components of the evoked potential, such as amplitude, latency, and relative amplitude between the left and right hemispheres.

To take two specific examples of ongoing research, a study by John et al. (1967) visually presented square and diamond patterns of two different sizes to subjects and recorded the evoked potentials from the scalp, which signal neuronal activity. They found that the evoked potential wave form seemed to code stimulus quality; that is, the responses were much more similar for the same object of different sizes, than the other way around. Furthermore, sometimes the subjects reported seeing a square when in fact they were shown a diamond, and vice versa. Under those conditions, the evoked potential correspond to what the subject reported seeing, rather than the physical stimulus—a striking example of the correspondence between a category of neuronal activity and a psychological process that is not stimulus-bound. The second example is provided by a study of Teyler et al. (1973), which demonstrated that evoked potential wave forms do appear to code the cognitive-linguistic aspects of language. That is to say, different meanings of an ambiguous word exhibit different wave forms: rock (a stone) exhibits one kind of wave form, whereas rock (to rock a boat) exhibits another kind of wave form. When the subject reports thinking or is instructed to think of one meaning or the other, the two wave forms are clearly distinguishable.

A second type of experiment that has profound implications for brain and behavior in humans, particularly in relation to early environment and subsequent education, is the work of Rosenzweig (1970) and his group at Berkeley. In brief, they raised some rats in "rich" environments in which they lived in groups in large play areas with many toys and interesting stimulus objects; others were raised individually in laboratory cages. In the animals raised in the rich environments, they found substantial and significant increases in the number of synapses formed on neurons in the cerebral cortex as well as an increased thickness of cortex, greater number of glial cells, and greater amount of AChE—all of which indicates neurological benefits from the stimulating, open environment.

Other laboratories are pursuing the explanation of this phenomenon.

Perhaps the key problems in psychobiology are the brain substrates of learning and memory. At present we have a rather good idea of the neuronal mechanisms underlying habituation, which roughly means adapting to, or getting used to, a stimulus (Kandel 1976, Thompson et al. 1973). Habituation is perhaps the simplest form of learning. It has been and is being studied in a variety of laboratories whose subjects range from spinal models and intact-organism behavior to simple invertebrate animals. In many of these laboratories, there is a growing consensus that habituation is due to a process called synaptic depression. After repeated activation, certain synapses show a pronounced and prolonged decrement in transmission, which requires substantial periods of time to recover. Of course, habituation is a simple, even trivial, aspect of behavior in humans. Far more important in the present context is associative learning. We have, as yet, no really accurate ideas about the role of neuronal mechanisms in such learning; however, as indicated above, certain compelling parallels seem to be developing between brain studies of learning and memory in animals and human information-processing approaches (Atkinson and Shiffrin 1968).

Another important topic is the relation of chemistry and behavior—psychopharmacology. We have only scratched its surface, since we have yet to do the fundamental studies relating to the effects of various chemicals, ranging from LSD and other psychogenics to anesthetics, on chemical synapses in the brain and their relations to the generation of behavior. It is reasonable to expect that fundamental breakthroughs will come only when we understand how these chemical reactions at synapses alter behavior and experience. A specific example in the context of education is the widespread use of drugs for "hyperactive" children. To date there have been few adequate evaluative studies of the effects of these drugs on learning and related processes, let alone behaviors more directly related to activity level. The recent review by Whalen and Henker (1976)[7] analyzed the effects of psychostimulant medication for hyperactive children. In general, they found conflicting evidence regarding possible beneficial effects of the drugs on attention, cognition and learning in these children. Furthermore, up to 40 percent of children so treated showed no behavioral improvement! Whalen and Henker strongly emphasized the dearth of knowledge and theory regarding the use and effects of such drugs on children.

The examples given above are only a small selection of the many ways in which an increased understanding of the neurobiological substrates of human information processing are relevant to the ability to improve and direct the process of learning and assist those who are handicapped in these abilities.

Example 5: Innovation and Change in Educational Institutions

Educational Goal

Schools have changed their organization and methods of instruction over the last decade (e.g., open classrooms, modern math, pass-fail grading), but the results of these innovations are largely unknown and we have little basis for evaluating further proposals for change. It would be extremely useful if we could more accurately predict whether a given innovation would increase educational effectiveness in a particular setting.

Public Issues

This nation has traditionally valued innovation. Each decade has brought new social issues to public awareness—the science-technology gap, the plight of the poor, the role of women—and attached to each have been calls for new educational approaches. Today, however, debates about the value of innovation and change per se are frequent.

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[7] See also the discussion of psychopharmacology in the previous example.

Many citizens consider past educational innovations as expensive, ineffective fads, adopted more in response to the hopes of educators than because a compelling body of knowledge or experience argued for them. Others object more to the way decisions are made, especially in large, consolidated school districts. There is concern about the adequacy of the information that parents and taxpayers are given about proposed change. Educators are worried about innovation and change. Some believe that they are pressured to move from one innovation to the next with such rapidity that nothing succeeds. School administrators argue that change costs money that they do not have, while others view innovation as a way to command increased resources. Still others complain that although innovations developed in one setting do not transfer well to others, the courts or state boards of education often require uniformity. On a more general level, nearly everyone would like program decisions to be more "rational."

Research Issues

Fundamental research on change and innovation in organizations, as compared with applied or evaluation research, is designed to discover how people in organizations receive, communicate, accept, and reject information or ideas; how they make decisions for the organization; and (less frequently) how they are affected by organizations. The field may be characterized by two general approaches: the application of principles of human behavior derived from laboratory studies (for example, information processing (see Slovic et al. 1977) or small group decision making (see Staw and Salancik 1977)) and the development of general theories of organizational communication, motivation, decision making, and productivity. For brevity, we confine our remarks here primarily to the latter category.

A new development in fundamental research on organizations is the study of communication and its implications for decisions made in organizations. Imagine, for example, the following decision: to reallocate expenditures in a large school district so as to equalize access to special programs among pupils. For several reasons, among them the lack of a single decision maker and the geographical diffuseness of affected citizens, a traditional decision model is inadequate (Connolly 1977).[*] One must consider how all the participants in the decision process communicate with each other, where they are located, and the impact of official and unofficial components of their communication (informal meetings among teachers, for example).

Some of the research on this problem draws on both systems theory and information theory (see for example Richards 1974); other work is designed to refine and test the adequacy of such concepts as power and uncertainty (see for example Pfeffer and Salancik 1974). This work has stimulated a rethinking about communication in organizations. Traditionally, researchers have assumed that organizations (as represented by an individual, coalition, etc.) pursue goals, and that the function of communication is to obtain information for reaching these goals. Communication, however, may be serving different interests, such as providing incentives to individuals to continue participating, justifying the outcomes of decisions, or even discovering what the goals are (Georgiou 1973, Weick 1969).

Research on communication in organizations shows promise for better understanding of why organizations innovate and how to devise effective innovations. For example, some theorists suggest that communication functioning to reduce uncertainty (about how others will react to a program, for example) will cause some individuals to seek out more information than they need to make an accurate decision. This hypothesis has been derived from Bayesian studies of conservation, empirical studies of organizations, and studies in very different contexts (e.g., mental health diagnosis) (see for example Edwards 1968, Ackoff 1967, Oskamp 1965). One implication is that the decision and implementation of innovations might be improved if there were some way of reducing overloads of irrelevant information, rather than by increasing the quantity of information, as is sometimes prescribed.

Other fundamental research on organizations aims at understanding decision making; this work is probably the largest activity relevant to innovation and change now underway (see Allison et al. 1975). Some of this research concentrates on understanding the class of institutions we call public or nonprofit (including educational institutions). Decision making in public institutions is quite different in some important ways from that in private enterprise. In educational organizations, for example, objectives and goals are often ambiguous and difficult to measure. The objective "good citizenship" in a school is far more open to alternative interpretations and is much harder to measure than is "good productivity" in an automobile factory. The result of this ambiguity and uncertainty may be decision making designed to define a problem (rather than solve it), to create stable operating procedures (rather than effective ones), or to distribute rewards according to a sub-unit's contribution to the organization's resources (rather than its contributions to outcomes). Recent studies, for example, indicate that budgetary decisions in educational institutions may be more attuned to satisfying the demands of departments or units whose power differs (because, for example, they have attracted more or fewer students) than to maximizing the benefits of various budgetary allocations (see for example Pfeffer and Salancik 1974, Shumway et al. 1975).

Some research on organizations is designed to create models of optimal or usual decision making. This research suggests that prescriptions for educational institutions in the future will differ from those for organizations whose objectives and technologies are relatively clear. One example of this research is the theoretical work now being done on alternatives to the traditional analytic model of organizational decision making. The analytic paradigm assumes that individuals (and organizations) maintain well-defined preferences for different ends and evaluate options by using this preference ordering. Theorists including Herbert Simon, Charles Lindblom, and others have argued that this model fails to recognize the special characteristics of organizations like educational institutions. One alternative approach being developed is known as incremental decision making (Lindblom 1975). This model assumes that decisions in public organizations proceed in small, marginal steps, designed to cope with uncertainty and conflict of values or ends and to enable changes in plans when the effects of decisions are unacceptable. One theorist (Steinbruner 1974) has likened the process of decision making to a simple cybernetic paradigm and has shown that information-processing principles can account for non-incremental changes in policy.

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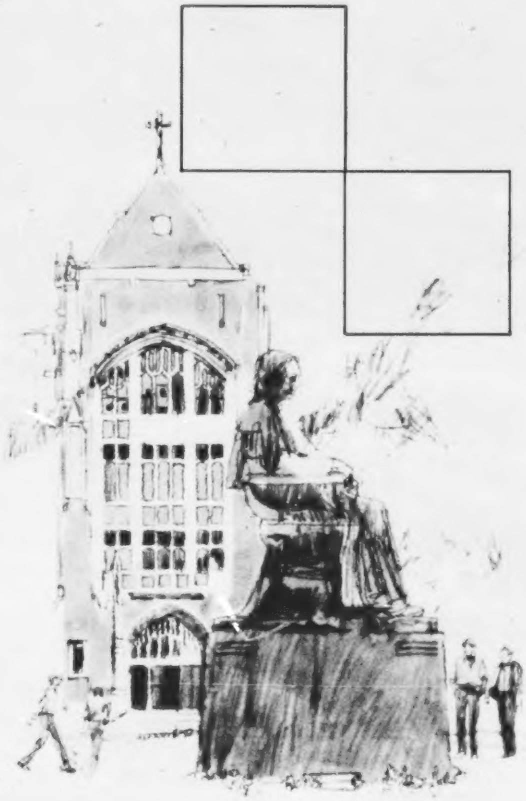
[*] This review includes an interesting discussion of problems in organizational communication research.

An important aspect of decision making according to these untraditional views is that decision makers, for both political and cognitive reasons, tend to adjust their thinking about problems to normative beliefs and values as well as to decisions they have made that are related to those beliefs and values. Decisions, then, may be more closely related to salient beliefs than to empirical information. Some research on this topic has been heavily influenced by laboratory studies of consistency, post-decision changes in attitude, and commitment, many of which were carried out by the intellectual descendants of Kurt Lewin. Case studies of organizations have stimulated ideas about how beliefs come to be shared and the circumstances under which they become salient in organizations. Cohen and March's study (1974) of university presidents, for example, has suggested that ambiguity in organizations causes minor problems to spill over into conflicts about values. A discussion of some research laboratory space, for example, can easily become an argument over the relative importance of teaching versus research in a university. A process of that sort could have important implications for understanding the problems an organization faces when it has to take new, important actions.

The research we have described cannot be claimed by any single discipline. Researchers from psychology, political science, economics, sociology, anthropology, and mathematics are involved. Many associate themselves with the overlapping multidisciplinary fields of management science, industrial psychology, organizational behavior, and communication. While much of the work in these latter fields is properly viewed as applied research, another portion of it is fundamental.

To understand innovation and change in educational institutions, there exists a clear need for fundamental inquiry. Public discussion and research on educational policies often presume that innovation is a single attribute of organizations that can be evaluated independently of specific programs and contexts. Conclusions about innovation have erred in their generality ("innovation does not work") and in their ambiguity ("all innovations in school practices are not automatically good").[9] Fundamental research may help us to understand much more precisely why specific programs are ineffective or effective and how they come to be adopted by some institutions but not others.

Example 6: Opportunities for Higher Education



Educational Goal

Post-secondary education has a central role in determining an individual's socioeconomic attainment. For this reason and because higher education provides an unusual opportunity for intellectual development, it has been generally accepted by most Americans that the chance to pursue a higher education should be offered to all persons who would benefit from it.

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[9] The Washington Post (Dec. 23, 1976) greeted the results of a three-year, nationwide evaluation of educational innovation (Project Longstep) with a first-page story headlined, "Innovative Education Held to Make Little Difference"; such articles led the report's authors to issue a revised press release maintaining that their findings showed only that "innovation per se does not guarantee dramatic improvement in student achievement." (Quotations are from the revised press release, Does Educational Innovation Pass or Fail? American Institutes for Research, January 7, 1977).

Public Issues

Ultimately, policy making for higher education prompts a reexamination of the goals of higher education. As far as economic considerations are concerned, these goals have frequently been summarized under the slogan "access, efficiency, and equity." In particular, this implies (1) that higher education should ideally be available to everyone for whom the "benefit" exceeds the "cost"; (2) that the costs of these benefits should be minimized; and (3) that the system should ensure equity in the distribution of benefits and costs.

Research Issues[10]

The U.S. higher education system emphasizes "consumer sovereignty," at least in the choices of institutions by students. Public and private institutions compete for students, through both "price" (tuition and financial aid) and "product" (program selectivity, location, size, etc.). Surprisingly little is known about the factors that influence individual student choices or the demand for higher education.

It is known, of course, that numbers are important. Individuals, institutions, and the federal government during the last decade invested at ever-increasing rates in postgraduate education (Cartter 1976). Yet current demographic trends are causing a levelling off of enrollments in higher education (or at least a decline in growth rates). This, in turn, has caused a dramatic decline in the demand for new faculty, which has resulted in unemployment and underemployment for persons with advanced degrees in most fields. This result has potentially threatening consequences for the intellectual vigor and age structure of universities and research institutes. What is particularly curious about the latter state is that, to paraphrase one demographer's analysis, a few paper-and-pencil calculations could have been made over a decade ago to predict the virtual inevitability of current distress.

In the current quest for intelligent policies concerning the future of graduate education, academic tenure and retirement, and the support of scientific research, both legislators and administrators will require more adequate understanding of the functioning of the academic labor market and more generally, the demand for and supply of educated persons. The collection of longitudinal data on the career plans of individuals and the plans of institutions will be important in understanding these processes, as is more general research on the relationships among education, occupational attainment, and income. The association of income and education has, during the last decade, begun to attract the attention of social scientists doing empirical and theoretical work not only in economics but also in sociology and social psychology (see for example Taubman and Wales 1974, Mincer 1974, Sewell and Hauser 1975, Jencks et al. 1974).

Important benefits have flowered from cross-disciplinary interest in this topic. For example, well-known psychological variables such as IQ have begun to be regularly employed in economic analyses (see for example Taubman and Wales 1974, Griliches and Mason 1972, Bowles and Nelson 1974), while standard econometric methods (e.g., structural equation models) have been widely adopted as important tools in sociological research.[11] Substantive work in these and other areas frequently requires longitudinal information on individuals whose careers are followed for many years.[12]

Fundamentally important questions are also raised by the recent suggestions that federal and state governments aid private universities more directly in their struggle to survive. First, there are questions familiar to both experts in public finance and to public citizens: Who really pays for such support from tax dollars and who benefits? (Carnegie Commission on Higher Education 1973). Because of the enormous complexity of the U.S. tax structure and the fiscal relationships among federal and state agencies, any attempt to answer these questions brings us to the frontier of basic research in economics.

A second set of questions arises when we consider the need to maintain such institutions. Typically, their existence has been justified by the claim that private institutions can provide excellence and diversity more easily than their public counterparts. To put this claim in perspective, however, we need a deeper understanding of student demand for alternative modes of higher education as well as the consequences of such experiences (Radner and Miller 1975).

Finally, the prospect of increased government support of private higher education has been accompanied by a more intense demand for accountability to government agencies. One can predict that government agencies will not provide funds from the public treasury without strings attached. One can also predict that uncritical application of traditional accounting and operations research paradigms of business or education will produce many silly (and some potentially disastrous) outcomes. But the fact is that we presently know little about the principles of rational administration of institutions that deal in processes and outputs that have thus far defied comprehensive quantification. Obviously, any adequate accounting of costs and benefits should include social as well as private benefits and costs and qualitative aspects. Here again, the questions bring us to the frontiers of social science research, although, in this case, it is a frontier that has been relatively neglected by an economic science that is predominantly market-oriented.

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[10] The Brookings Institution recently organized a conference on Public Policy and Private Higher Education. Although the focus of the conference was on public policy issues in a circumscribed sector of U.S. education, the conference papers and discussion touched on most topics in current fundamental economic research relevant to education at all levels. This section is based upon the issues and research discussed at the conference (see Breneman and Finch, in press).

[11] See discussions in *Sociological Methodology: 1969* and following years and Goldberger and Duncan 1973, Blalock, 1971.

[12] Longitudinal data sources include the Wisconsin longitudinal survey of socioeconomic achievement; the National Survey of Health and Development in England; the National Longitudinal Survey of Youth, and the Comprehensive Roster of Scientists and Other Persons with Higher Degrees. The collection of such data is expensive, and longitudinal studies are too often abandoned prematurely because of the vagaries of funding. Although more costly than much traditional social science research, these costs are small by comparison to those incurred in the hard sciences. Sustained support for the careful collection of longitudinal data would greatly facilitate basic research on these topics.

Example 7: Educating Children for a Culturally Pluralist and Multilingual Society

Educational Goals

The children who enter American schools have mixed cultural and ethnic origins; some do not speak fluent English. While there is no consensus about the responsibility of schools toward children from different cultural and language backgrounds, the following general principles are widely accepted:

1. Schools should educate all children in the dominant language and culture sufficiently to permit participation in national life.
2. Schools should introduce children to other cultures and languages and educate children in analytic rather than moralistic approaches to social and cultural differences (e.g., understanding how the same behavior or symbol might come to have different meanings in two cultures.)
3. Schools should be responsive to the families and communities from which children originate. They should teach children to understand and respect their own cultural heritage.

Public Issues

The question of what educational accommodations should be made for diverse ethnic groups is very much alive in current political debates. An earlier national policy of "Americanization" through uniform schooling has been supplanted by a more pluralistic policy. Recent legislation favors the provision of extra resources and special arrangements for minority children, enhanced parental and community control over schooling, and programs to make schools more hospitable and effective for children of diverse backgrounds. Generally, controversy no longer centers on the desirability of the trend toward "cultural democracy," but rather on the kinds of accommodations needed and the effectiveness of specific programs. Among the most frequently mentioned questions are: How can we enhance the general educational attainment of children who enter school with a language and a cultural background different from the majority? How does one modify the curriculum and the management of schools to give children a sense of their own special background and cultural identity? What is the importance of the curriculum tradeoff between the time spent on "basic skills" and the time spent on "cultural heritage?"

Research Issues

Multilingualism is one aspect of this topic that raises important social science questions. One of these questions—the cognitive advantages or disadvantages of children's learning two or more languages—is being explored on a fundamental level through the study of psycholinguistics. While knowledge about first language acquisition has grown (see for example Brown 1973, Moore 1973), we need to forge theoretical links between this knowledge and the understanding of the learning of a second language. We still do not know to what extent learning a second language involves "beginning again." The problem derives, in part, from inadequate descriptive knowledge of the process of successive language acquisition. There are also theoretically important questions about the existence and character of transfer processes in language learning (see Carrol and Freedle 1972). In what manner, if any, does mastering the grammar and lexicon of one language aid—or impede—the learning of subsequent languages? How are the grammatical rules governing different languages psychologically differentiated by multilingual persons? Does the mastery of a second set of symbols for representing experience affect the fluency of an individual's thought? Does such mastery alter the rate or character of children's intellectual development? Some theoretical work and empirical evidence pertinent to these questions exists. For example, longitudinal studies of English children who attend bilingual (French-English) primary schools in Quebec (Lambert et al. 1973, Barik and Swain 1976), have begun to dispel the widely held notion that early bilingualism retards cognitive development.

There is still considerable controversy about the relationship between language learning and cognitive development. In recent years, however, theorists have begun to consider new alternatives. Thus, those who have long maintained that cognitive structures (or understanding) precede the acquisition of linguistic structures (language to express what is understood) are now examining this simple notion of "one-way action."[13] The currently increasing emphasis on cross-cultural studies of development[14] may in the future force substantial revision of ideas about the role of linguistic factors in general and bilingualism in particular in the mental development of children.

Cultural pluralism raises other issues. In analytic approaches to cultural differences and social problems, the education of children presumes the existence of sound knowledge and theory about the way in which children think about such matters; but in fact we know little about how children at different ages conceptualize larger social problems and solve the social dilemmas with which they must deal. Over the past fifty years, the most influential theories of children's cognitive development have grown from studies of the nature of children's thoughts about physical reality, dreams, causality, and moral behavior (see, for example Piaget 1928, 1946, Kohlbert and Turiel 1971, Selman and Lieberman 1975). Curiously, there exists little parallel work describing the nature and development of thinking about important social processes, such as peer pressure, conflict, or economic exchange. The reason, possibly, is due to the assumption that because children are not skilled verbally expressing adult-like concepts of social situations, they do not have any such concepts. Some researchers think, however, that children are able to perceive many things they cannot express well in words (Ginsburg and Koslowski 1977). Although we cannot foretell the theoretical questions that will emerge from this fundamental research, we believe that research can at least serve to chart the correspondences between the development of logic in children and the evolution of their understanding of social processes.

If the understanding obtained from this research is to be applied in educating children about social and cultural matters, many additional questions remain to be studied. For example, Do textbook descriptions of cultural differences adequately allow for children's developing ability to view behavior from other people's perspectives? To what extent do children in this society experience different cultural settings? What effect does this have on them? How do they adapt their interpersonal style to changing contexts? How do young children understand history? For example, when they see a depiction of slavery on television, can they put themselves back in time to see how it might have happened? While short-term results cannot be expected, fundamental research on these and related issues can serve to lay a foundation on which to construct better informed educational policies.

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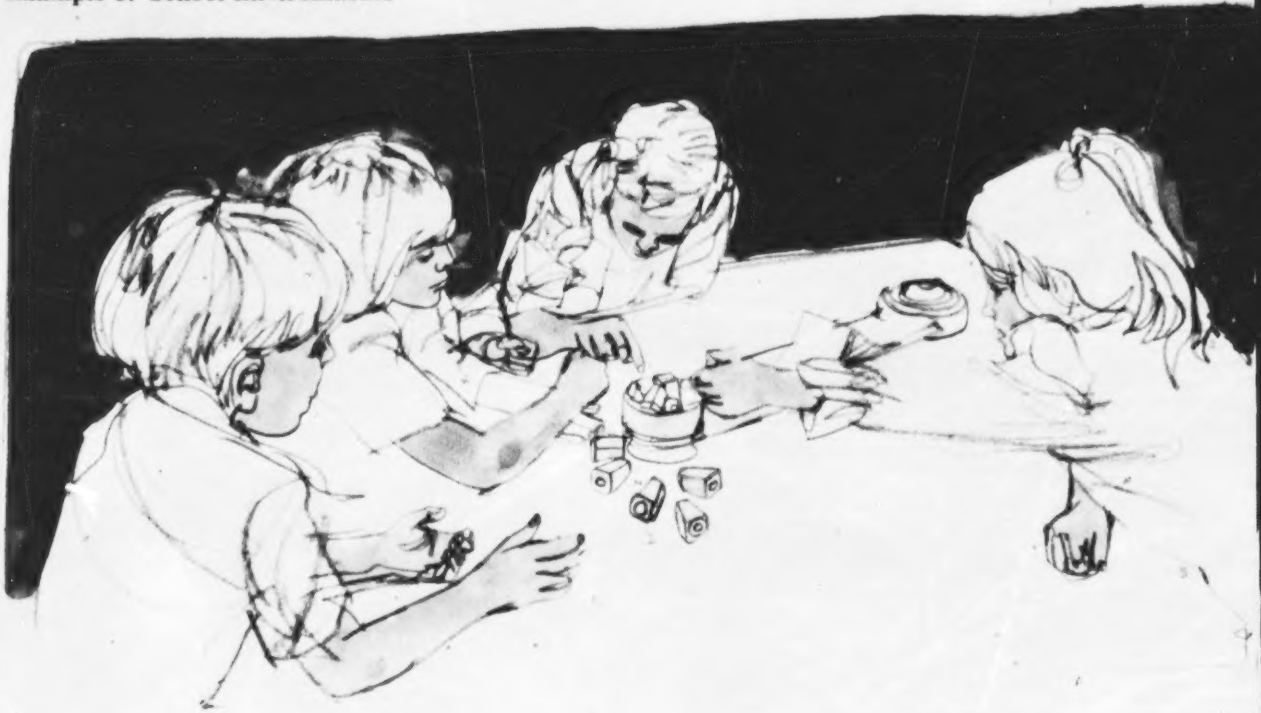
[13] See review and discussion by Beilin (1976).

[14] This interest is evidenced by the founding in 1966 by the International Union of Psychological Sciences (under subvention from UNESCO) of the *International Journal of Psychology* whose major task is providing a forum for cross-cultural studies of psychological processes, and the more recent creation of a *Journal of Cross-Cultural Psychology*.

Example 8: School Environments



Educational Goals

School should offer safe, productive environments for teaching children, and children in the classroom should behave in a manner that is conducive to learning, that is respectful of others, and that promotes development towards responsible adulthood.

Public Issues

Decisions about the organization of school environments so as to facilitate learning are usually understood to be the responsibility of teachers and school administrators. Some aspects of school environments, however, have become a matter of broader concern. Prominent problems for some schools, especially big-city schools, have been disorder, disruptiveness, and lack of safety. A less urgent but more sustained kind of debate exists about classroom environments that are perceived as unsupportive or harmful to children. Parents do not agree—as, indeed, school professionals do not agree—on definitions of an optimal classroom environment. Some disagreements derive from the fact that different children need different environments, and some reflect different images of what a proper school should be like. In the end, there are those who argue for environments that are structured and orderly; those who argue for environments that are free and open; and those who argue for classrooms that will be hospitable to children from special backgrounds or who have special needs.

Research Issues

Perhaps the most urgent needs of school today are to reduce crime, vandalism, and disorder. It would be unwise to assume that these are technical problems to be solved through research or, for that matter, to assume that the sources of those problems are within the school walls. Schools must take in children of different races, classes, and ethnic affiliations, children who are prone to crime, children afflicted with emotional disorders. They take in community conflict and community problems. From time to time, public initiatives such as desegregation or mainstreaming may create disturbances in schools—disturbances it is hoped that will be short-term and that will lead to counterbalancing long-term benefits.

Research will not adjudicate the political conflicts and choices impinging on schools, any more than it will do so for the larger society, but it can be of distinct value in defining the problems attributable to school environments. For example, some famous studies have played a prominent role in defining the terms of public debate about schools because they indicated where schools and school environments might make a difference in exacerbating or alleviating social problems. These include works on such questions as the economic and social impact of schooling—the Coleman Report (Coleman 1966) and the Jencks et al. (1972) volume on inequality. In addition, historical studies (Cremin 1961, Tyack 1974) are offering new conceptions of the functions that schools have served and may now be serving for American society. Sociological studies (Flanagan et al. 1962, Coleman et al. 1966, Lash and Sigal 1976) can try to provide a clearer picture of what children and their lives are like. Studies by sociologists, psychologists, political scientists, and organizational theorists (Becker 1963, Tannenbaum 1937, Lemert 1972, Keniston 1967, Coleman 1961) are designed to find the reasons why people deviate from the rules or standards of society or are perceived as deviating from them. In short, a major benefit of research is that it points toward the sources and nature of social problems, including those school problems that people subsume under the category of discipline.

The debates over what school environments do and do not do—what impact they have—has stimulated interest in the particular effects of different classroom environments. There is research, not only on the kinds of settings that alleviate "discipline" problems, but on classroom environments that create or reinforce prosocial behavior and positive motivation. For example, an important question in education generally is how one teaches cooperativeness, responsibility, and persistence. Some recent research on the development of expectations and causal attributions of children indicates that these cognitive processes are important components of motivation and behavior (see for example Bandura and Walters 1959, Seligman 1975, Jones et al. 1971). Some of this work had led already to the testing of new teaching techniques for handling problems such as disorderliness and fear of mathematics (see Dweck 1975). Yet fundamental research relevant to problems of classroom environments has broader, more long-term benefits, too; we list a few:

1. It can contribute methods for the more careful description and analysis of classrooms and of their effects on children. At present, methods drawn from anthropology, ethnology, and psychological ecology are being brought into increasing use in the careful observation of classroom processes and interchanges.

2. It can provide ideas about important individual differences in children and suggestions about their educational implications. One of the most critical problems in the management of any classroom is the range and variety of human individuality. Children differ in the way they approach problems and in their reactions to frustration, distraction, and stress. Current research on cognitive styles has revealed some of the idiosyncratic ways in which children look at problems and think about them (see Kagan and Kogan 1970). There are systematic social class differences in the way children approach school, and these, too, need careful description.

3. It can identify major growth patterns in a child's development of moral judgment, ego strength, and social judgment (see Kohlberg 1964, Jones 1968, Loevinger 1966, Livesley and Bromley 1973, Flapan 1968). Children understand themselves and others differently as they mature. They manage themselves and their learning in systematically different ways.

4. It can assist in the handling of special problems. Some idiosyncratic problems of children have an unusually large effect in creating disturbances of the classroom. Hyperactive children in the early grades and aggressive or emotionally disturbed children in the later grades play an important role in disrupting classrooms. To the extent that research can assist in locating sources of these problems and finding techniques of management, it can contribute to the maintenance of a more optimal learning environment for the majority of children (see Henker et al. 1976). ☐

What is the Nation Looking for in Today's Schools?

At a time when there is much criticism of our schools and their ability to help children learn, we find it significant that one of the Council's newest members has publicly articulated the condition of American education with more realistic balance:

"I do not know a country with a population as diverse as ours and so tumultuous an educational history that is doing as well as we are," Harold Howe II, former U.S. Commissioner of Education, recently observed. "We have built a diverse galaxy of public and private schools; and we have rid ourselves of a legally-supported and racially-defined dual system of schools. In 1900, about six percent of youth finished high school; today the comparable figure is eighty percent, and about half of them go on to further education . . . The task before us for the remainder of this century is to keep the door of opportunity open for those the schools don't serve well, without shortchanging either the new aspirants to opportunity or those who have customarily had it."*

With our colleague, the Council is aware that whether one looks at the Congressional Record, the Gallup Poll, the results of school bond votes, or just listen to parents, it is plain that many Americans feel our schools have severe shortcomings. The concern is real and deserves to be dealt with; educators can ignore it only at peril to their integrity and their profession. If they do not tackle these problems, and are not perceived to be dealing with them earnestly and with some success, or if they do not redefine them to make clear to the public which problems can legitimately be dealt with by the schools and which cannot, others may *impose* "solutions" on the schools.

Troubled Parents and Schools

The three concerns which most trouble the public underscore the inseparability of the schools' from society's problems: lack of discipline, integration/segregation, and inadequate financial support. These have been cited in the same order in opinion polls since 1972. When asked by the Gallup Poll how to improve the overall quality of education in the public schools, more than half the parents with children in school believed that the schools should devote more attention to teaching basic skills and enforcing stricter discipline. More than a third also thought the schools should emphasize career education and salable skills; twenty-three percent felt that academic standards should be raised, and, of those who had heard of the "back-to-basics" movement, eighty-three percent favored it. Some even thought "basics" included respect, manners, politeness, discipline and similar virtues.

Along with other citizens and parents, the members of the Council desire to see all children attain a mastery of basic skills in the elementary school. We also wish that education at all levels would foster individual development

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*From an address to the National Conference on Achievement Testing, Washington, D.C., March 1-3, 1978, by Harold Howe II, Vice President for Education and Research of the Ford Foundation, and member of the National Council on Educational Research (1978 to 1980).

Chapter 6

Reflections on Education and Educational Research

of moral and ethical values and impart intellectual curiosity and the joy of learning as well. We want to be confident that educational credentials represent meaningful achievement with reason to be honored in the community. That seems to demand a good deal, but not more than ought to be asked.

Pedagogic Despair

Some want even more. The researchers and educators canvassed by the committee that prepared the NAS report on fundamental research registered an even wider range of expectations for educational institutions; forty percent of the responses emphasized that learning should be the primary function, while sixty percent mentioned training for occupations, good citizenship, mental health, or national development.

Commenting on such expectations in a letter to NIE, Harvard sociologist David Riesman observed: "(This) makes clear how much Americans have traditionally asked of education, including the emphasis on non-cognitive issues in the survey made by the (National Academy of Science) Committee itself; teachers, handling this bundle of missions with the American belief in the omnipotence of the will (now somewhat chastened but still strong) and also sharing the common American belief that if something is good, it is necessarily compatible with other good things . . . can be crushed by the feeling at once of being monitored by one's ideological and pedagogic superego and by the society in its more volatile elements." This, coupled with some teachers' self-blame that not all students achieve average levels of scholastic performance can lead to the condition Riesman terms "pedagogic despair."

When one adds to these expectations the mandates of Federal and state legislators that schools serve the socially, economically, and educationally disadvantaged, and that they also provide equal opportunities for students of limited English-speaking ability and for the handicapped, the challenge to our schools and teachers is obvious. Consider, too, that to declarations about equality and excellence policymakers add demands for efficiency. The result: an "iron" triangle within which policies are made and programs attempted. The ensuing problems and shortfalls in achievement are then laid at the doorstep of the schools. The question must therefore be asked: What can the schools reasonably be expected to accomplish?

"Failure" and Success, School and Society

Addressing this question, Thomas Green of Syracuse University has pointed out that the oft-noted "failures" of American education are part of the result—a direct result—of its successes. As access and opportunities have expanded, he says, so has the disappointment with what one finds. Teachers are criticized for being less effective by a public less tolerant of a child's lack of achievement at the very time they are attempting to teach a greater range of students. It may be that some teachers are not doing as well as their predecessors, and it may be that some schools are not as exciting nor as accomplished as they once were or as they could become; but perhaps the nation's expectations of schools have increased more than the schools' capacity to meet those expectations. Educators, legislators and citizens alike have believed that greater investments in education would resolve the schools' chief difficulties.

Today this is less clear. Accelerated social change in the 1960's gave way to stabilizing and consolidating efforts in the mid-1970's. In general, the public is becoming aware that it is easier to create demands on resources than to generate the resources to meet those demands.

Not an Engineering Task

The public, however, has not been sufficiently informed that we do not yet possess enough knowledge to assure a reasonably successful resolution to many educational problems including, and perhaps foremost, knowledge of how education takes place; how people mature, learn, and interact; and how social institutions affect the people and the process. Too often educational problems are thought of and dealt with as if they were straight-forward problems in engineering—make the decision, appropriate the money, and organize the know-how. In this scenario the honest researcher or educator is often forced to be a nay-sayer, calling attention to the fact that, far from having the "solution," we do not yet even fully understand the problem.

Facile Solutions Are Unjust to All

What the public sees as educational problems and the way it sees them (as reinforced or reflected by the media) are conveyed in the demands and pressures voters exert upon their elected representatives. At both the state and Federal level, legislators respond to these concerns with the readiest tool at hand: legislation. They may mandate new education policies or may appropriate funds for new programs, in the trusting belief that doses of discipline or money will solve the problems. Too often, however, insufficiently researched and quickly thought-through legislation may impede the education process and prove unfortunate for all concerned.

This can be cruelly unfair to the object of the exercises, the child. It is surely unjust to parents, who are led to believe their concerns have been met. It is demoralizing to the educator whose experience belies the "solution" from the start. It burdens policy-makers and administrators with tasks beyond the system's capacities. And, finally, it is unfair to the legislator, whose impulse is laudable but whose encounters with complex educational issues are usually all too brief amid the welter of other priorities demanding attention.

School and Society

As noted in last year's Annual Report: "People often do not recognize that the schools are only one means of many institutions responsible for resolving social problems, and the cost of trying to accomplish all these tasks is enormous. Lately, we have had a clearer perception of these limits, both those imposed by financial resources and those created by the social environments in which schools operate." In saying this, we do not argue that the schools can wait for society to reform itself; though the schools suffer the ills and the ideals of society, they are nonetheless leaders, established and supported by that society to sustain high standards, to renew our collective will, and to instill the energy to exercise that will for a common good and for individual fulfillment.

It is valuable to remind ourselves that social equations have two sides; today there is a positive emphasis on the schools as engines of social reform and, negatively, as the source of the decline in society's competence to meet its challenges. Even in the best of circumstances the schools cannot meet these challenges alone, not while American society is in the midst of reappraising its place in the community of nations and reconsidering the ways its economic and political rewards are distributed. This reappraisal does not submit to the cold mechanisms of bureaucracies, decision memos, and cost-benefit analyses. These are issues that test the spirit, that call for leadership, that spring from our Constitution and history. They must be fused into a general sense of welfare and will, rather than into specific laws or programs or even research agendas.

We have extended these remarks because research is often challenged as being inconclusive and irrelevant. Researchers are often confronted with demands to show how their work has "resulted" in specific changes, and achievements. Research has indeed contributed greatly to what we are doing and how well we are doing it; nonetheless, excepting the rare instances when a fundamental "truth" is uncovered, research findings do not *compel* their use. They are instead made useful through invention and implementation.

The Tempermental Nature of Research

Research often disquiets; it challenges assumptions as it probes reasons, tests assertions and appraises claims of success and complaints of failure. The very nature of research thus tends to mute the clarion call of leadership and to impose caveats on a "clean line" of argument—it offers conditional positions in the face of absolute demands.

Therefore, while we urge sustained support for research and advise policymakers and practitioners to value researchers as partners, we also understand that resources must be allocated and actions taken which are approximations based on "best judgment" that include large doses of expectation and hope. We urge only that research be considered *before* these judgments are made, that individuals who can attempt to link research to practice also be engaged in the process of policy development and program design, that research continue to be supported even after programs are undertaken; and that there be a tolerance for the natural disappointment that follows when "the best-laid plans. . . ."

A Case in Point

The public and policymakers are often impatient with researchers who go over the same questions and attack the same problems time and again. A case in point is the much-discussed decline in standardized test scores, which has led to reports issued by a privately-sponsored panel chaired by former Secretary of Labor Willard Wirtz (entitled *On Further Examination*) and by a panel of the National Academy of Education (NAE). The decline has prompted innumerable articles, speeches, position papers, platforms, and policies. There has been debate on cultural bias in tests, of the balance of standardized tests and other assessment instruments, and of the relationships among important skills and the tests that purport to measure their acquisition.

The nature and proper uses of standardized tests had previously been the subject of many studies, among them a review commissioned by the College Entrance Examination Board published in 1970 under the title *Righting the Balance*. That report led to improvements in the tests and in their use.

Today, however, the debate still rages about the appropriateness of various tests and the effects of those tests on educational opportunities in our society. No doubt there will be more commissions, studies and reports, for these are matters which we imperfectly understand and which demand continued examination.

The NAE Committee on Testing and Basic Skills Study, released in September of 1977, raises serious questions about current policies and proposals to use tests as "final evaluators" of students' learning before issuing them high school diplomas. We agree that the present state of educational testing may not meet the expectations reflected in recent "accountability" legislation. We concur with the NAE in its conclusions that the Federal Government should support research on the factors which produce measurable changes in educational achievement and should foster the dissemination of information designed to increase understanding of the uses—and limitations—of standardized tests.

NIE is undertaking these tasks. Pending our findings, we hope that the research community will not only understand the impulses of policymakers but will also examine with open minds the experience of new state testing programs. For only then can we expect policymakers and educators to listen to researchers willingly and hopefully.

In addition to supporting studies of standardized tests, the Council is in strong agreement with Harold Howe's recommendation that NIE support major research on what he calls the "soft" factors in judging student achievement. These are, in his words, the "non-quantifiable aspects of human beings that must be considered in decisions about them." We say this because of our underlying belief that education is directed at both the cognitive and affective domains, that both are important for a satisfying and productive life, and that both should be considered when assessing students and schools.

Whatever pattern state policies on testing may assume, we are likely to be left with the question of what to do with the results of these tests and other measures of student achievement. One growing practice which needs careful examination is that of judging a school solely by the test scores of its students. Just as several factors should be considered when evaluating students, so must many factors be accounted for in evaluating schools. And just as it is difficult to know what has contributed to a student's achievement, and how it has, so is it difficult to know the makings of a good school.

For example, though continued investment in education is clearly important, there is no convincing evidence that a dollar more invested will reap a "dollar more" in educational outcomes. Those outcomes depend upon a special combination of teachers and principals, home, community and students, to generate the exciting educational environment that results in "greater achievement than expected" from previous experience. Present testing trends make it more urgent than ever to study the factors that make for "achievement."

The Broad View

Research is often criticized for focusing on the minutiae and ignoring the "big picture." Important questions are often stated in ways that appear trivial or irrelevant to the classroom teacher. Practitioners believe *they* experience the overall view from their perspective, while researchers believe it is *they* who see beyond situations encountered in the classroom to general phenomena common to all classrooms. But narrowly-defined questions may well hold the key to more expansive phenomena.

It is a tenet of fundamental research that the pieces of a puzzle are as worthy of study as the whole. Each specific element interacts with others; that interaction as well as its overall effect must be taken into account.

As in the design of research, so is there a tension between specific and comprehensive reform in designing solutions to educational (and social) problems. What parts should be examined in a way that will significantly affect the whole? Must some of the fine details be overlooked in opting for comprehensive reform, or the "big picture?" We applaud those general reforms that allow the school to address such questions, to respond more specifically to each student's needs, capacities and aspirations, for such reforms enhance the fine balance between the individual and the group.

Researchers must explain their approaches to educational problems and the reasons for those approaches, and we believe NIE has a role in assisting them to do so. They must draw educators and education agencies into the research enterprise, as co-sponsors, collaborators, and colleagues.

Strengthening the Research and Development Network

One aspect of strengthening the research and development network is to link state and local agencies more closely to the R&D network, particularly when embarking on major reform of educational strategies. NIE can play a role in this process by identifying similar efforts in other school districts, by making reference to research literature, and by capitalizing on natural experiments which can complement researcher-designed experiments. Such studies are often accorded greater credibility among practitioners. At the same time, we urge state and local education agencies to draw upon the research staffs available in their own agencies, in nearby universities, and at centers around the country. In this way the design of their reforms can draw upon the best current research knowledge available.

NIE is an agency of government that is at the same time a part of the educational research community. As such, it is well-positioned to act as a catalyst between the two. The NIE Director can, for example, invite the attention of legislators and government policymakers to the policy implications of its own research and the research of others, not limiting such advice to studies that have been mandated by Congress.

Conversely, NIE could do more to help other research-oriented institutions point their efforts to research "that makes a difference" by identifying topics and areas for which it knows there is a ready audience among policymakers and educators. This audience identification role could be an important NIE service.

In the same vein, we believe that the Institute must undertake greater efforts to encourage the popular media to make the public aware of existing research findings on troublesome problems. Magazines, television, newspapers and professional publications in fields other than education should all be considered as a means for making the public aware that educational research is conscious of the "real" problems of education, and is working on them. In this way, too, NIE researchers can emphasize the relationship we noted in Chapter 5 of this Report, the translation of researchable questions back into popular concerns, thereby refining and illuminating those concerns. NIE might also attempt to guide journalists toward a more insightful and authoritative examination of educational issues, thereby aiding their understanding and coverage of educational issues at hand.

Policy Considerations

We have mentioned many characteristics of research and the research enterprise; we cannot close without noting briefly some of the tensions which must be faced as we move toward our goals.

Among the ways NIE can exercise its leadership role are: (1) identification of problems and targets of opportunity for productive work, (2) support of capabilities of various organizations to conduct and use research and development, and (3) direct support for selected applications of research results to change educational practice. The course to take, and the allocation of NIE resources, are proper subjects for Council consideration.

We must also consider the balance of fundamental and applied studies, the extent and strategies of Federal research support in light of limited state and local research programs, and the over-arching reality of the dependence of educational research activities almost solely on public funds; these issues suggest judgments which are part of the Council's policy process.

In Chapter 5 we reported our current judgment about NIE support for fundamental research. Director Graham is seeking ways to relate research more closely to efforts to improve educational practice, recognizing that examination and reform of practice often identify gaps in our knowledge and thus suggest research. Local and state support of such offices is to be encouraged and their inclusion in NIE's views of research and development will enhance the entire national effort.

As research becomes a more familiar part of educational policy and practice, there will be pressure to formalize organizational relationships, codify rules, and involve more parties in the regulation of the enterprise. These tendencies hold a potential for great tension and some harm. The research community has strong and well-conceived traditions of peer review for determining worthy researchable questions, for evaluating the quality of work, and for the selection of projects meriting major financial support.

Nevertheless, there are reasonable arguments for significant involvement of educators in the determination of research priorities and in the conduct of studies. Educational agencies can enhance the value of many research activities by participating as co-sponsors and by having their staffs serve as collaborators and colleagues.

These possibilities intersect concerns about the research enterprise. As Director Graham notes in her essay comprising Chapter 3 of this Report, we must consider educational significance as well as methodological elegance when selecting projects for public support. And we must value "craft" knowledge born of experience and reflection as well as "scientific" knowledge.

Thus, the research community faces the opportunity of partnership with educators in efforts to improve education, and it faces the limits of having others participate in setting the research agenda.

It may be unfair, but it is also healthy that education is being criticized today as never before—that stems from its attempt to do so much for so many. Problems in education and society that were hidden, but always there, are being held up to the light, to be examined and discussed. It is plainly a time when education and the nation need educational research as never before. ☐

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